3.10 NOISE

3.10.1 Background and Methodology

3.10.1.1 Regulatory Context

The analysis of aviation noise impacts is primarily the responsibility of the Federal Aviation Administration (FAA). For a list of Federal statutes, FAA regulations, FAA guidance, State of California regulations, and County of Sonoma policies related to the consideration of noise impacts, see **Appendix M**. In addition, the *California Airport Land Use Planning Handbook* (*Handbook*) was used as a technical resource to assist in the preparation of the noise analysis.

3.10.1.2 Thresholds of Significance

Aircraft Noise

Sonoma County has adopted land use and noise compatibility policies to address existing and potential noise impacts at noise sensitive uses, which include the following:

- Residences
- Schools
- Hospitals, nursing homes
- Churches, libraries
- Long-term medical or mental care facilities
- Office building interiors
- Other uses deemed noise sensitive by the local jurisdiction

The Thresholds of Significance used in this study include:

1. Sonoma County General Plan – Noise Element

The Noise Element includes the following policy as it relates to airport and transportation noise on public roadways:

> Policy NE-1b: Avoid noise sensitive land use development in noise impacted areas unless effective measures are included to reduce noise levels. For noise due to traffic on public roadways, railroads and airports, reduce exterior noise to 60 dB L_{dn} or less in outdoor activity areas and interior noise levels to 45 dB L_{dn} or less with windows and doors closed. Where it is not possible to meet this 60 dB L_{dn} standard using a practical application of the best available noise reduction technology, a maximum level of up to 65 dB L_{dn} may be allowed but interior noise level shall be maintained so as not to exceed 45 dB L_{dn}.

2. Sonoma County General Plan – Air Transportation Element

The Air Transportation Element (ATE) supports and guides the future growth and development of the air transportation services within Sonoma County in a manner that is consistent and reinforces the policies stated in other elements of the General Plan. The goal of this element is to maintain the land uses adjacent to the Airport compatible with existing and future Airport operations.

The ATE includes the following policy as it relates to noise and compatible land uses adjacent to existing airports:

> Policy AT-1a: Proposed development within a noise environment in excess of 55 dBA CNEL shall comply with the Sonoma County Comprehensive Airport Land Use Plan.

3. Sonoma County Comprehensive Airport Land Use Plan (CALUP)

The CALUP describes the noise compatibility standards of the six public use airports within Sonoma County. All residential uses are unacceptable with noise above 65 dBA CNEL. Residences are conditionally acceptable between 55 and 60 dBA CNEL, subject to an outdoor-to-indoor noise level reduction of at least 25 decibels, and between 60 and 65 dBA CNEL, subject to an outdoor-to indoor noise level reduction of at least 30 decibels. Schools, libraries, hospitals, and nursing homes are unacceptable in areas exposed to noise above 60 dBA CNEL and are conditionally acceptable between 55 and 60 dBA CNEL subject to a noise level reduction of 25 decibels. Churches, auditoriums, and concert halls are unacceptable at noise levels above 65 dBA and are required to provide for noise level reductions of 25 to 30 dB if they are located between 55 and 65 dBA CNEL.

The noise compatibility standards are listed in **Table 3.10-1**.

4. FAA Airport Environmental Assessment Criteria

Impacts due to noise exposure associated with the operation of the airport would be considered significant if the project would cause a discernable increase in noise levels. The increase in noise levels due to the project is based on a comparison of conditions with the project and conditions without the project in the same analysis year. For transportation noise, an increase in noise levels of 5.0 dB is considered discernible where existing noise levels are less than 60.0 dB CNEL. In addition, an increase in noise of 3 dB or more is considered discernible for existing noise levels between 60 and 65 dB CNEL and an increase in noise by 1.5 dB or more is considered discernable for existing noise levels greater than 65 dB CNEL.

Appendix G of the *CEQA Guidelines* provides that a project may have a significant noise impact if it would result in:

5. California Environmental Quality Act Guidelines

1. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies
2. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels
3. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
4. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels

Table 3.10-1
SONOMA COUNTY CALUP NOISE COMPATIBILITY STANDARDS

LAND USE CATEGORY	CNEL, dBA				
	less than 55	55-60	60-65	65-70	more than 70
RESIDENTIAL					
Rural (less than 1 dwelling unit/acre)	A	C/a/	C/b/	U	U
Urban - low density (1-4 units/acre)	A	C/a]	C/b/	U	U
Urban - medium to high density (more than 4 units/acre)	A	C/a/	C/b/	U	U
Transient lodging, except hotels and motels	A	C/a/	C/b/	U	U
Mobile home parks	A	C/a/	C/b/	U	U
PUBLIC					
Schools, libraries, hospitals, and nursing homes	A	C/c/	U	U	U
Churches, auditoriums, and concert halls	A	C/c/	C/d/	U	U
Transportation, parking, and cemeteries	A	A	A	A	C/c/
COMMERCIAL AND INDUSTRIAL					
Hotels and motels	A	A	C/c/	C/d/	U
Offices and retail trade	A	A	C/c/	C/d/	U
Service commercial, wholesale trade, warehousing, and light industrial	A	A	A	C[c]	C/d/
General manufacturing, utilities, and extractive industry	A	A	A	A	A
AGRICULTURAL AND RECREATIONAL					
Cropland	A	A	A	A	A
Livestock breeding and zoos	A	A	A	A	U
Parks and playgrounds	A	A	A	A	C/c/
Golf courses, riding stables, and water recreation	A	A	A	A	C/c/
Outdoor spectator sports	A	A	A	C/e/	U
Amphitheaters	A	U	U	U	U

A = Acceptable land use.
C = Land use is conditionally acceptable upon meeting compatibility criteria. (See notes below.)
U = Unacceptable land use. Land use is not permitted.

/a/ An NLR* of at least 25 decibels is required. The granting of an avigation easement to the airport operator shall be required. The recording of a fair disclosure covenant shall also be required.

/b/ An NLR* of at least 30 decibels is required. The granting of an avigation easement to the airport operator shall be required. The recording of a fair disclosure covenant shall also be required.

/c/ Measures to achieve an NLR* of 25 decibels shall be incorporated into the design and construction of portions of these buildings where the public is received, office areas, or sleeping areas.

/d/ Measures to achieve an NLR* of 30 decibels shall be incorporated into the design and construction of portions of these buildings where the public is received, office areas, or sleeping areas.

/e/ Sound reinforcement system is required.

*NLR Outdoor-to-indoor noise level reduction in A-weighted decibels assuming doors and windows are closed.

SOURCE: COMPREHENSIVE LAND USE PLAN FOR SONOMA COUNTY, 2001
PREPARED BY: MGA/L&B, 2011

6. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels

Traffic Noise

Roadway noise is covered by Policy NE-1b, discussed above.

3.10.1.3 Methodologies

Aircraft Noise

The methods used here for describing existing noise conditions and forecasting the future noise environment rely extensively on computer noise modeling. The noise environment is commonly depicted in terms of lines of equal noise levels, or noise contours. These noise contours are supplemented here with specific noise data for selected points on the ground.

The FAA's Integrated Noise Model (INM) Version 7.0b was used to model aviation operations for the Airport for purposes of identifying the extent of aircraft noise exposure. The original INM was released in 1977.[1] The latest version, INM Version 7.0b, was released for use in 2009, and is the state-of-the-art in airport noise modeling. The INM is a large computer program developed to plot noise contours for airports. The program is provided with standard aircraft noise and performance data for over 100 civilian aircraft types that can be tailored to the characteristics of an airport, as well as a database of military aircraft types. Version 7.0b includes an updated database that includes some newer aircraft, the ability to include run-ups in the computations, the ability to include topography in the computations, and the increased differentiation between different types of aircraft (civil, military, and helicopter). Noise contour files from the INM were loaded into the ArcView Geographic Information System (GIS) software for plotting and land use analysis.

The INM program requires the input of the physical and operational characteristics of an airport. Physical characteristics include runway coordinates, airport altitude, and temperature and, optionally, topographical data. Operational characteristics include various types of aircraft data. This includes not only the aircraft types and flight tracks, but also departure procedures, arrival procedures, and stage lengths (flight distance) that are specific to the operations at an airport. Aircraft data needed to generate noise contours include:

- number of aircraft operations by type;
- types of aircraft;
- day/night time distribution by type;
- flight tracks;
- flight track and runway utilization by type;
- flight profiles;
- typical operational procedures; and
- average meteorological conditions.

For a detailed discussion of all parameters and assumptions used in the noise model, see **Appendix M**.

[1] United States Department of Transportation, Federal Aviation Administration, *Integrated Noise Model (INM) Version 7.0 User's Guide*, April 2007.

Traffic Noise

The noise levels along public roads in the vicinity of the Airport were computed using the Highway Noise Model published by the Federal Highway Administration[2]. The FHWA Model uses traffic volume, vehicle mix, vehicle speed, and roadway geometry to compute the "equivalent noise level." A computer code has been written which computes equivalent noise levels for each of the time periods used in the calculation of L_{dn}. Weighting these noise levels and summing the results in the L_{dn} for the traffic projections used. L_{dn} contours are found by iterating over many distances until the distances to the 60, 65, and 70 L_{dn} contours are found.

The noise levels were computed for the following five scenarios:

1) Existing Conditions (2009)
2) Conditions in the Year 2015 Without Proposed Project
3) Conditions in the Year 2015 With Proposed Project
4) Conditions in the Year 2030 Without Proposed Project
5) Conditions in the Year 2030 With Proposed Project

Traffic volume data used to calculate traffic noise levels is presented in **Section 3.12**, Traffic and Transportation. Average daily traffic (ADT) volumes are required to compute L_{dn} values. The traffic analysis in Section 3.12 only analyzed peak hour traffic volumes and did not estimate ADTs. ADTs used for the traffic noise calculations were estimated from the peak hour traffic volumes. Non-airport-related peak hour traffic (i.e., background traffic) volumes would be expected to be approximately 10% of ADTs and airport-related peak hour traffic volumes would be expected to be between 15% and 18% of the project traffic ADTs. Therefore, the average AM and PM peak hour volume without the Proposed Project were multiplied by 10 to estimate the ADTs and the average AM and PM peak hour volumes with the Proposed Project were multiplied by 6.7 to estimate the project ADTs. The ADTs with the Proposed Project were added to the ADTs without the Proposed Project to determine the total ADTs. This approach is considered to be conservative in estimating ADTs associated with the Proposed Project.

3.10.2 Existing Conditions

Aircraft Noise

The 55, 60, 65, 70, and 75 dB CNEL noise contours for 2009, 2015, and 2030 were produced to address the Sonoma County General Plan and Comprehensive Airport Land Use Plan (thresholds of significance number 1, 2, and 3). **Table 3.10-2** identifies the size of the respective CNEL contours in 5 dB increments. CNEL is a measure of the overall noise experienced during an entire day and annualized. In the CNEL scale, noise occurring between the hours of 7 pm and 10 pm is penalized by approximately 5 dB and during the night (10 pm to 7 am) is penalized by 10 dB. This penalty was selected to attempt to account for the higher sensitivity to noise in the evening and nighttime hours.

The existing 2009 noise contours are shown in **Figure 3.10-1**. The largest contour is the 55 CNEL contour and the smallest contour is the 75 CNEL (see **Figure 2-4 Appendix M**, as reference). The runway utilization and operational flow are clearly depicted in the shape of the noise contours. Noise contours southeast of the Airport are primarily influenced by departures from Runway 14. The small “node” of noise contours east of the Airport is primarily influenced by helicopter operations at the helipad.

[2] Federal Highway Administration, 1978, Highway Traffic Noise Prediction Model, FHWA-RD-77-108.

Table 3.10-2
2009 CNEL AREA IN ACRES

CONTOUR CNEL (DB)	TOTAL ACRES
55 – 60	1,006
60 – 65	398
65 – 70	159
70 – 75	71
75 +	50
55 CNEL and greater	**1,684**

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

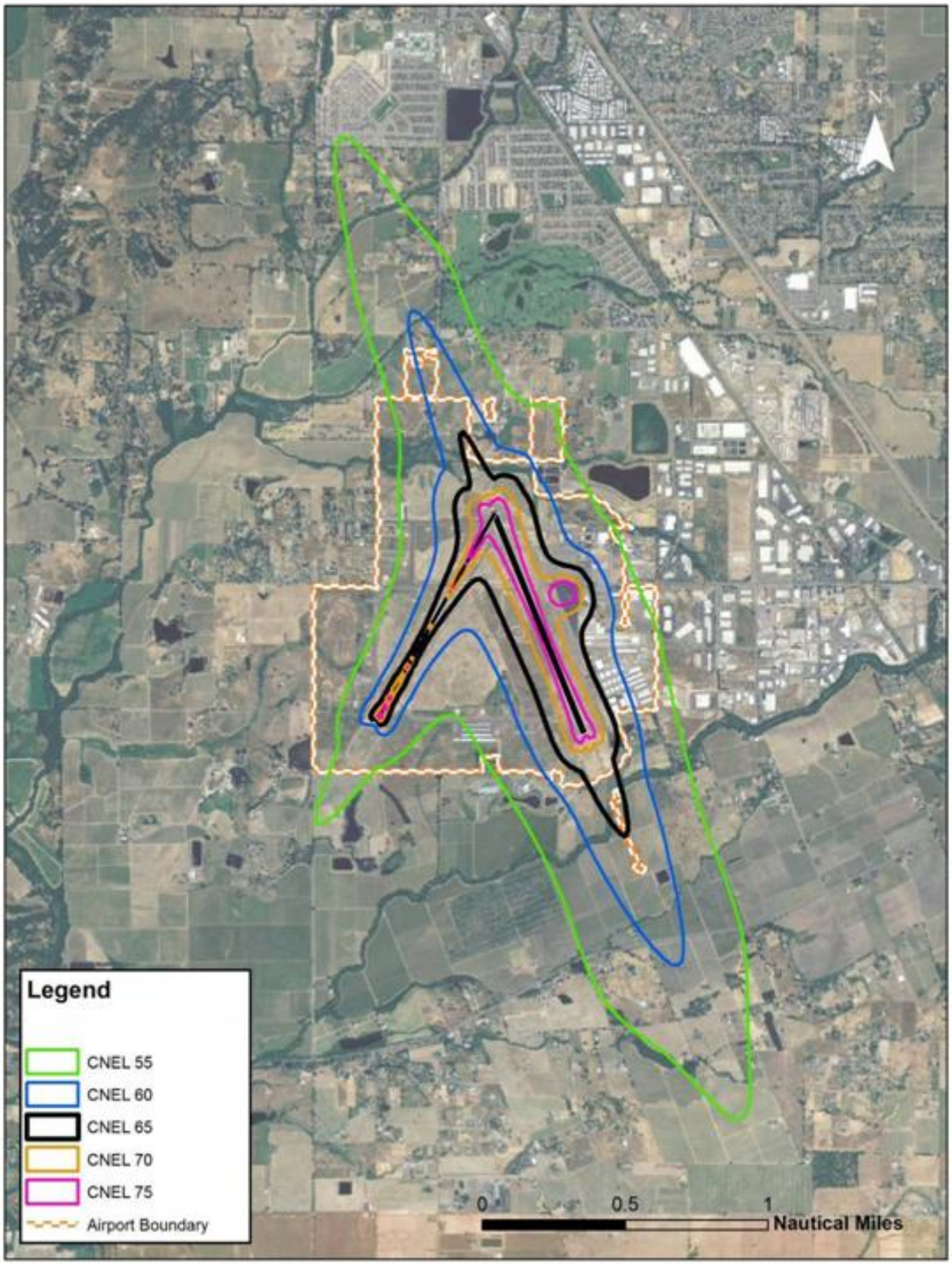
In addition to the noise contours, noise modeling results can be expressed in tabular format in terms of CNEL at specific representative locations. INM Version 7.0b was used to determine the noise levels at receptor sites in the Airport vicinity. A list of these locations is presented in **Table 3.10-3** and graphically depicted in **Figure 3.10-2**. These receptor sites represent noise sensitive areas at the residential areas closest to the Airport and underneath flight paths. Noise sensitive uses include residential, educational, health, and religious structures and sites, and parks, recreational areas (including areas with wilderness characteristics), wildlife refuges, and cultural and historical sites. Although Sites 1, 2, and 4 are not located in areas classified as noise sensitive land use, they are adjacent to residential areas. The modeled noise levels at the receptor sites for the existing conditions are shown in **Table 3.10-4**.

Table 3.10-3
NOISE RECEPTOR SITES

Receptor Sites	Name	Land Use	Latitude	Longitude
1	Airport Property East	Airport	38.523521	-122.818619
2	Airport Property West	Airport	38.521286	-122.808591
3	Triple Oak Way	Residential	38.483326	122.787684
4	Cutrer Winery	Commercial	38.498762	-122.832633
5	Rio Ruso Drive	Residential	38.556559	-122.821350
6	Windsor High School	School	38.541974	-122.820859
7	Mitchell Lane	Residential	38.532424	-122.803425
8	Trione Circle	Residential	38.534734	-122.815327
9	Olivet Road	Residential	38.478978	-122.819909
10	Piner High School	School	38.462467	-122.767275

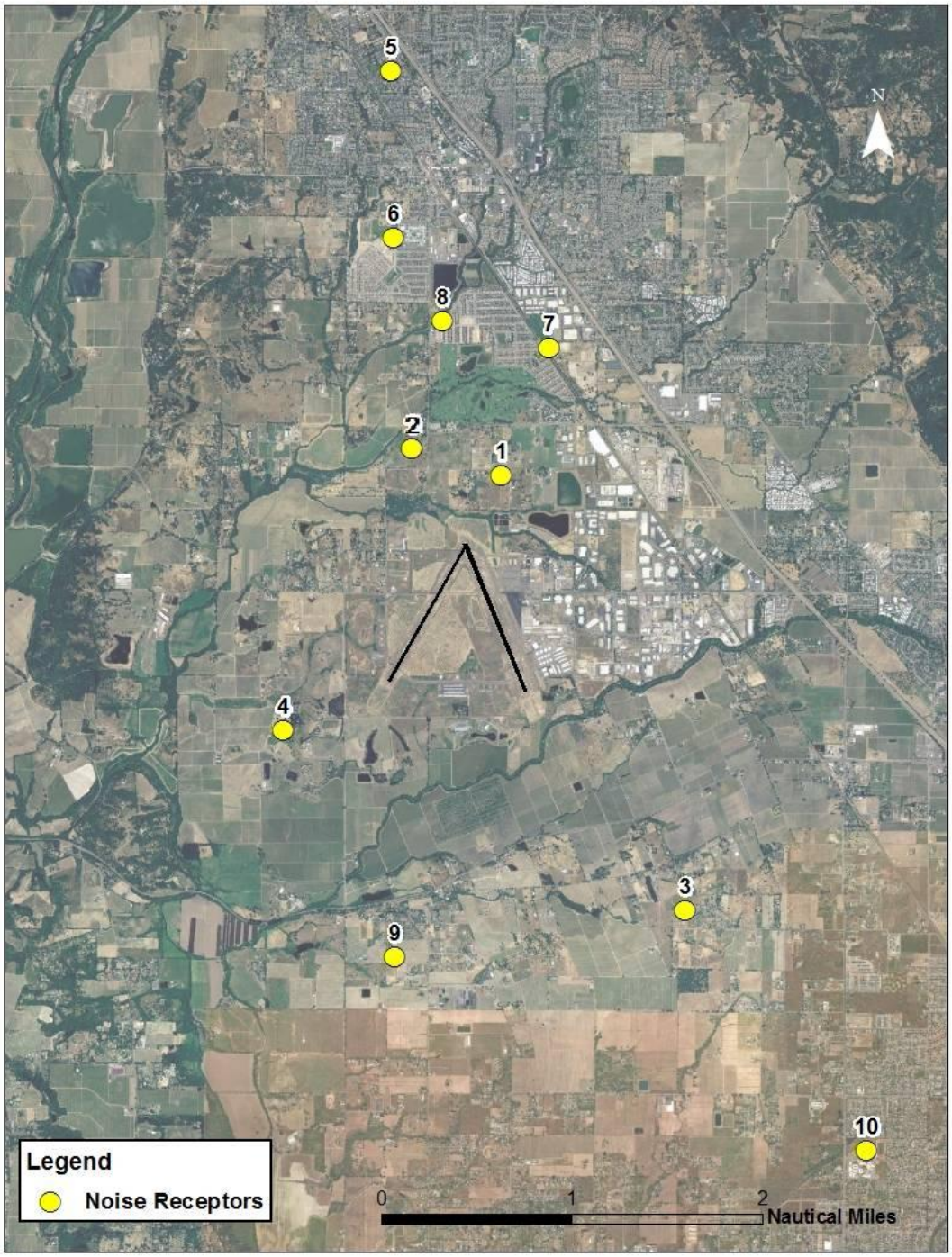
SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Figure 3.10-1
2009 CNEL CONTOURS



SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Figure 3.10-2
NOISE RECEPTOR SITE MAP



SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Table 3.10-4
NOISE RECEPTOR MODELED 2009 CNEL ANNUAL AVERAGES

Receptor Sites	Name	Land Use	2009 CNEL (dB)
1	Airport Property East	**Airport**	59.4
2	Airport Property West	Airport	55.2
3	Triple Oak Way	Residential	50.9
4	Cutrer Winery	Commercial	47.3
5	Rio Ruso Drive	Residential	44.6
6	Windsor High School	School	49.9
7	Mitchell Lane	Residential	47.8
8	Trione Circle	Residential	50.1
9	Olivet Road	Residential	47.8
10	Piner High School	School	43.2

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

On-site noise measurements were performed at each noise receptor site during August 2009. The measurements lasted approximately three days at receptor sites 1-4 and lasted a few hours at receptor sites 5-10. (Due to limited resources, the common practice during temporary noise measurements is to select some sites for 24-hour CNEL measurement and some sites for measurements that last a few hours for single event and background measurements). Sites 1-4 were selected for CNEL measurement because they were the closest to the airport. The sound level meters used to determine the noise levels were Brüel & Kjær meters, which comply with specific International Standards (IEC) and measurement standards established by the American National Standards Institute (ANSI) for Type I instrumentation. Noise events that exceeded the sound level threshold of 65 dB for duration longer than three seconds were classified as aircraft noise events and used to calculate aircraft CNEL at receptor sites 1-4. Noise events at sites 5-10 were classified as aircraft noise events by matching them with actual aircraft operations observed by a technician at each receptor site.

The data collected during the measurements can be summarized as a noise environment in terms of the noise level exceeded 10 percent, 50 percent, and 90 percent of the time and designated as ($L_{percentage}$) $L_{10,}$ $L_{50,}$ $L_{90,}$ respectively. The L_{10} is the noise level exceeded 10% of the time and represents the typical peak noise level. The L_{50} is the median noise level. L_{90} is the noise level exceeded 90% of the time. The L_{90} is a good approximation of the background noise level (i.e., the noise level that would occur in the absence of identifiable noise events). **Table 3.10-5** lists the L_{10}, L_{50}, and L_{90} levels at each receptor location.

The noise measurement data were used to compute CNEL at receptor sites 1-4. The measurement periods at receptor sites 5-10 lasted a few hours and collected single event levels and background noise levels. An aircraft only, a community (non-aircraft), and a total CNEL were calculated for each site. The aircraft CNEL was calculated from all one-second data that was recorded at each site during an aircraft noise event (see **Appendix M**). The community CNEL was computed from all one-second data that were recorded at each site when there were no aircraft noise events. These CNEL values of a few days of measurements should not be compared to an annual average CNEL value because, during the measurements, different

aircraft types, runway utilization, and wind conditions may not have been the same as those used to calculate the annual average CNEL. The results are shown below in **Table 3.10-6**.

Table 3.10-5
AMBIENT NOISE LEVELS BY RECEPTOR SITE

Receptor Sites	Name	Land Use	L_{10}(dB)	L_{50}(dB)	L_{90}(dB)
1	Airport Property East	Airport	47.5	40.8	34.7
2	Airport Property West	Airport	47.7	40.8	34.4
3	Triple Oak Way	Residential	48.1	39.3	34.2
4	Cutrer Winery	Commerical	50.4	47.9	45.9
5	Rio Ruso Drive	Residential	56.2	49	44.4
6	Windsor Oaks Acadamy	School	51.8	45.7	43.1
7	Mitchell Lane	Residential	50.1	46.5	44.2
8	Trione Circle	Residential	52.2	44.8	39.7
9	Olivet Road	Residential	45.5	37.9	35.3
18	Piner High School	School	50.5	45.3	41.7

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Table 3.10-6
CNEL AT RECEPTOR SITES 1 THRU 4

Receptor Sites	Name	Land Use	Aircraft CNEL (dB)	Community CNEL (dB)	Total CNEL (dB)
1	Airport property East	Airport	47.5	40.8	34.7
2	Airport Property West	Airport	47.7	40.8	34.4
3	Triple Oak Way	Residential	48.1	39.3	34.2
4	Cutrer Winery	Commerical	50.4	47.9	45.9

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Traffic Noise

Table 3.10-7 presents the average daily traffic volumes determined as specified above and used to predict traffic noise levels. For purposes of analysis, a speed of 45 mph was assumed for all roadway links and scenarios (this approach is conservative because any roads with a lower posted speed limit would result in a lower noise level).

Table 3.10-7
AVERAGE DAILY TRAFFIC VOLUMES FOR TRAFFIC NOISE ANALYSIS

Roadway Segment	Without Proposed Project			With Proposed Project	
	2009	2015	2030	2015	2030
Shiloh Road					
West of Skylane Boulevard	6,975	7,300	8,185	7,330	8,265
East of Skylane Boulevard	13,400	14,475	16,550	14,589	16,882
West of Conde Lane	13,645	14,575	16,575	14,689	16,927
East of Conde Lane	15,535	16,400	20,160	16,490	20,415
West of U.S. 101	17,345	18,350	21,800	18,440	22,038
East of U.S. 101	14,585	15,825	18,925	15,842	18,959
Airport Boulevard					
West of Skylane Boulevard	2,240	3,360	6,360	4,110	8,859
East of Skylane Boulevard	7,500	8,315	11,350	8,861	13,400
West of Brickway Boulevard	9,190	10,060	13,000	10,626	15,054
East of Brickway Boulevard	10,550	11,665	14,385	12,168	16,177
West of Aviation Boulevard	12,800	13,685	15,510	14,188	17,296
East of Aviation Boulevard	21,700	22,850	25,275	23,353	27,040
West of U.S. 101	21,700	22,850	25,275	23,353	27,040
East of U.S. 101	9,390	12,175	18,990	12,252	19,181
Golf Course					
North of Shiloh Road	3,090	3,805	5,360	3,808	5,377
Skylane Boulevard					
South of Shiloh Road	7,345	8,200	10,325	8,347	10,814
North of Airport Boulevard	6,980	7,545	9,930	7,692	10,439
North Laughlin Road					
South of Airport Boulevard	4,530	3,150	3,840	3,207	4,242
Laughlin Road					
North of River Road	3,960	4,510	5,815	4,631	6,244
Woolsey Road					
South of River Road	600	625	690	625	690
Slusser Road					
North of River Road	3,265	3,340	3,515	3,340	3,532
Aviation Boulevard					
North of Airport Boulevard	8,680	9,000	9,725	9,000	9,705
South of Airport Boulevard	4,820	4,955	5,190	4,955	5,190
Brickway Boulevard					
North of Airport Boulevard	2,745	2,800	3,170	2,800	3,173
South of Airport Boulevard	1,845	3,475	4,375	3,539	4,606
Conde Lane					
North of Shiloh Road	2,810	3,375	4,865	3,398	4,922
River Road					
West of Slusser Road	7,685	7,900	8,310	7,927	8,397
East of Slusser Road	7,800	8,050	8,575	8,077	8,645
West of Laughlin Road	9,060	9,370	10,070	9,420	10,194
East of Laughlin Road	10,790	11,215	12,125	11,285	12,309

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

The FHWA traffic model calculates noise from automobiles, medium trucks (trucks with two axels and more than four wheels), and heavy trucks (trucks with three or more axels. Further, the L_{dn} metric weights noise that occurs during the nighttime (10 p.m. to 7 a.m.) hours. **Table 3.10-8** presents the percentage of traffic from each vehicle class during each period used to calculate the L_{dn} levels (this does not include construction-related traffic). This mix was developed based on traffic surveys in suburban areas and is expected to be representative of conditions around the proposed project.

Table 3.10-8
VEHICLE TRAFFIC MIX

Vehicle Class	Day	Night
Automobile	88.0%	9.34%
Medium Truck	1.7%	0.19%
Heavy Truck	0.7%	0.08%

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Table 3.10-9 presents the traffic noise level (in L_{dn}) at 100 feet from the centerline as well as the distance in feet from the centerline of the roadway to the 60 dB, 65 dB, and 70 dB L_{dn}noise contours for the existing traffic conditions.

Table 3.10-9
2009 TRAFFIC NOISE LEVELS

Roadway Segments	L_{dn} at 100 Feet /a/	Distance To L_{dn} Contour (feet) /a/		
		70 L_{dn}	65 L_{dn}	60 L_{dn}
Shiloh Road				
West of Skylane Boulevard	60.5	RW	50	108
East of Skylane Boulevard	63.3	36	77	166
West of Conde Lane	63.4	36	78	168
East of Conde Lane	64.0	40	85	184
West of U.S. 101	64.4	43	92	198
East of U.S. 101	63.7	38	82	176
Airport Boulevard				
West of Skylane Boulevard	55.5	RW	RW	51
East of Skylane Boulevard	60.8	RW	52	113
West of Brickway Boulevard	61.7	28	60	129
East of Brickway Boulevard	62.3	31	66	142
West of Aviation Boulevard	63.1	35	75	161
East of Aviation Boulevard	65.4	49	107	229
West of U.S. 101	65.4	49	107	229
East of U.S. 101	61.8	28	61	131
Golf Course				
North of Shiloh Road	56.9	RW	29	63
Skylane Boulevard				
South of Shiloh Road	60.7	RW	52	111
North of Airport Boulevard	60.5	RW	50	108
North Laughlin Road				
South of Airport Boulevard	58.6	RW	37	81
Laughlin Road				
North of River Road	58.0	RW	34	74
Woolsey Road				
South of River Road	49.8	RW	RW	RW
Slusser Road				
North of River Road	57.2	RW	30	65
Aviation Boulevard				
North of Airport Boulevard	61.4	27	58	125
South of Airport Boulevard	58.9	RW	39	84
Brickway Boulevard				
North of Airport Boulevard	56.4	RW	27	58
South of Airport Boulevard	54.7	RW	RW	44
Conde Lane				
North of Shiloh Road	56.5	RW	27	59
River Road				
West of Slusser Road	60.9	RW	53	115
East of Slusser Road	61.0	RW	54	116
West of Laughlin Road	61.6	28	60	128
East of Laughlin Road	62.4	31	67	144

RW = Within the roadway right of way /a/ From roadway centerline.

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

3.10.3 Environmental Impacts and Mitigation Measures

Impact 3.10.1: Construction Noise Impacts as a Result of Short-Term Project Elements

During the construction of the short-term project elements, noise from construction activities would occur. The closest noise-sensitive uses from any proposed construction location would be residential areas to the north and west of the Airport. The general types of equipment that may be expected to be used include the following:

- Cement and Mortar Mixer
- Excavators
- Grader
- Other General Industrial Equipment
- Paver
- Paving Equipment
- Rollers
- Rubber Tired Dozers
- Tractor Loader/Backhoe
- Trencher
- Water Truck

Construction equipment noise levels for this equipment and others are shown on **Figure 5-3** of **Appendix M**. This table shows the typical range of noise levels for common types of construction equipment. The levels shown are the A-weighted maximum noise level at a distance of 50 feet. Not all of this equipment will be used for this project, but until engineering design is complete and construction plans are developed it is not possible to positively identify equipment that will be used. It is not anticipated that pile drivers will be used for these projects. However, noise levels from a point source, such as construction equipment, decrease at the rate of approximately six dB with each doubling of distance from the source. For example, if a backhoe were 92 dBA at 50 feet, it would be 86 dBA at 100 feet, 80 dBA at 200 feet, 74 dBA at 400 feet, etc.

Of the equipment expected to be used on site, the noisiest will likely be the tractors, front loaders and other heavy construction trucks. This equipment ranges from the mid 70's to highs in the range of 94 dBA at a distance of 50 feet. Jackhammers and drills to the extent they are use have the highest maximum noise levels of about 98 dBA at a distance of 50 feet.

There are 6 homes or groups of homes that are the closest homes to the project construction or staging areas or construction haul routes for short-term project elements and are as follows and shown on **Figure 3.10-3**:

1. Home closest to south end of Runway 32, east of runway and located adjacent to a pond, about 400 feet from perimeter road construction site, and 1000 feet from the taxiway construction on the southwest side of the end of Runway 32. This home would experience short-term construction noise impacts during the filling of the pond and the construction of the access road. This home has been identified for acquisition in the Master Plan.

Figure 3.10-3
CONSTRUCTION NOISE RECEPTOR SITES

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

2. Home southwest of end of Runway 32 is approximately 200 feet from the access road construction area and 700 feet from the taxiway construction areas located on the southwest side of the south end of Runway 32. This home is identified for acquisition in the Master Plan.
3. Homes northeast of the end of Runway 14. The closest of these is approximately 350 feet from the construction and staging area for the runway lengthening project. The parcels containing the homes in area 3A are necessary for full implementation of the RSAs and are slated for acquisition. However, acquisition may occur after construction commences. The remaining homes shown in area 3B have been identified for acquisition in the Master Plan.
4. Homes west of the airport on the west side of Windsor Road north of Silk Road. These homes are approximately 1600 feet from the runway and access road construction. They are also about 85 feet from Windsor Road, which will likely serve as a truck route during construction. The use of Windsor Road from truck traffic at night may cause short-term construction noise impacts. Some of these homes front to Windsor Road and some are side to Windsor Road. Those that front on Windsor Road have the rear yards shielded from the noise from Windsor Road.
5. The time-share condominiums on Shiloh Road at Skylane Boulevard will be exposed to construction traffic noise from Shiloh Road. These condominiums are treated like a hotel use under the Sonoma County General Plan and are not considered a noise-sensitive use.

Table 3.10-10 shows the maximum noise levels for each of these five receptor areas for both construction activity and construction traffic.

Table 3.10-10
SUMMARY OF CONSTRUCTION EQUIPMENT AND CONSTRUCTION TRAFFIC MAXIMUM NOISE LEVELS

	Distance (in feet)		Maximum Noise Level (dBA)			
Location	Construction Areas	Construction Haul Road /b/	Construction Equipment	Jackhammers	Construction Traffic	Night Construction
1	400	-	76	80	-	No
2	200	-	82	86	-	No
3A /a/	350	-	77	81	-	Yes
3B	350	85	77	81	89	Yes
4	1600	85	64	68	89	Yes
5	-	85	-	-	89	Yes

/a/ Location 3A would be acquired as part of the short-term project elements.
/b/ Distance is to roadway centerline for the closest of the homes to the road.

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

Any disturbance would be most noticeable during nighttime construction activities. There will be approximately 20 nights of night construction activity during Phase 1 and 15 nights during Phase 2. The longest number of consecutive nights of construction is estimated to be 10 nights. During Phase 1 there would be no night truck trips on to the construction site and during phase

2, there would be as many as 80 trucks per night for a total of 3 nights. The night work would consist of:

- grading and paving at the north end where the two runways intersect; and
- grading and paving of Taxiway D at the south end of Runway 14/32.

This night work is necessitated by the need to work within the runway safety area (RSA). The runway must be closed when work occurs in the RSA.

A summary of estimated noise levels in each of the 6 residential areas with potential construction or construction traffic noise impacts is presented in the **Table 3.10-10**.

The County of Sonoma does not have a threshold for construction-related noise and does not limit the hours of construction. These issues on considered on a case by case basis. The County Noise Element does have a Table of Maximum Allowable Exterior Noise Exposures for Non-Transportation Noise Sources as shown in **Table 3.10-11**. These limits are not used as a threshold for construction noise, but are used here as an example of how construction noise levels compare to these limits. These are exterior noise levels, measured at the location of outdoor activity areas, not the property line. The outdoor activity area is usually the backyard for single-family homes.

Table 3.10-11
MAXIMUM ALLOWABLE EXTERIOR NOISE EXPOSURES FOR NON-TRANSPORTATION NOISE SOURCES

Hourly Noise Metric dBA /a/	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
L50 (30 minutes in any hour)	50	45
L25 (15 minutes in any hour)	55	50
L08 (5 minutes in any hour)	60	55
L02 (1 minute in any hour)	65	60

/a/ The sound level exceeded n% of the time in any hour. For example, the L50 is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level. The L02 is the sound level exceeded 1 minute in any hour.

SOURCE: MGA/L&B, 2011, Sonoma County General Plan Noise Element
PREPARED BY: MGA/L&B, 2011

The Noise Element table above effectively limits daytime maximum noise levels to 65 dBA and nighttime maximum noise levels to 60 dBA. As shown in **Tables 3.10-10** and **3.10-11**, construction noise levels would exceed the Noise Element Maximum Allowable Exterior Noise Exposures for Non-Transportation Noise Sources at all 6 receptor locations.

A common source of night construction noise complaints are back-up beepers. These beepers are an important safety feature. The requirements for these beepers is that they be heard above background noise at a distance of 200 feet, or that a flagger be used in lieu of the back up beeper. There is another alternative and that is the use of a backup beeper that adjusts its volume to the ambient noise level. This may be particularly useful at night when background noise levels are typically lower. Potential mitigation measures include the use of flagger in lieu of back up beepers or requiring back-up beepers that adjust level to background noise.

Temporary construction noise barriers, such as sound blankets may be of some use if they are high enough and have no flanking around the sides. This generally would require a continuous 'wall' of such blankets. While a minimum barrier of this type may provide from 5 to 10 dB of noise reduction, it is not practical along the haul roads as the necessary breaks for driveways would create holes in the barrier that would render them mostly ineffective.

Mitigation Measure 3.10.1A

Develop a construction noise control plan prior to initiation of construction. Night construction work should use back up beepers that adjust to ambient levels or use visual aids (e.g. flaggers or lights) as a substitute for back up beepers.

Mitigation Measure 3.10.1B

Unless night construction is required, all construction shall be limited to the hours of 7 a.m. to 5 p.m. on weekdays with no construction permitted on weekends or holidays.

Even with implementation of the foregoing mitigation, the temporary construction noise impact associated with nighttime construction would be considered significant and unavoidable. However, it should be noted that this impact would be of very short duration, lasting approximately 20 days during Phase I and 15 days during Phase II.

Impact 3.10.2: Change in Noise Contours for 2015

The construction of the Proposed Project would not change runway utilization or the flight track allocations compared to the existing conditions. The fleet mix, however, would change to reflect the forecast fleet mix. The 2009 and 2015 fleet mix are listed on Table **3.10-12**.

The Proposed Project would result in a change in the points at which the aircraft touchdown and the points at which aircraft begin the takeoff roll. Changing these aircraft flight characteristics would result in a change in the shape and coverage area of the noise contours relative to existing conditions.

The 2015 Proposed Project CNEL contours for the Airport were prepared using the Integrated Noise Model Version 7.0b. These contours are shown in **Figure 3.10-4**. The 2015 Without Proposed Project CNEL contours are shown on **Figure 3.10-5** for comparison.

Table 3.10-13 identifies the size of the respective CNEL contours in acres for the Proposed Project. The contour areas for the existing conditions and the 2015 Without Proposed Project are shown for comparison. As shown in **Table 3.10-13**, the greater than 70 dB CNEL noise contour area for the Proposed Project would be slightly larger than the 70 dB CNEL noise contour area for Without Proposed Project. However, the 55 dB CNEL and greater noise contour area for the Proposed Project would be slightly smaller than the 55 dB CNEL and greater noise contour area for Without Proposed Project. This is primarily because the departure threshold is moved north for south-flow traffic (the dominant traffic flow). Moving the Runway 14 landing threshold to the north will have two effects: it will cause the arrival noise to increase north of the Airport and the departure noise to decrease south of the Airport. The area of noise decrease will be larger than the area of noise increase. This shift will increase the

Table 3.10-12
AIRCRAFT OPERATIONS AND FLEET MIX – 2009 AND 2015

INM Category/Aircraft		2009	2015	
	Aircraft Description		**Without Proposed Project**	**With Proposed Project**
Jet				
737700	Boeing Business Jet	30	30	30
CIT3	Citation III	374	552	552
CL600	Challenger 600	625	921	921
CLREGJ	Canadair Regional Jet 200	-	-	1,460
CNA500	Citation I	700	1,031	1,031
CNA510	Citation Mustang	105	155	155
CNA750	Citation X	523	771	771
CRJ9-ER	Canadair Regional Jet 900	-	-	-
CRJ9-LR	Canadair Regional Jet 1000	-	-	-
DO328	Dornier 328	26	38	38
EMB120	Embraer 120	13	19	19
EMB145	Embraer 145	30	45	45
EMB190	Embraer 190	-	2,920	1,460
FAL20	Falcon 20	268	395	395
GII	Gulfstream II	17	26	26
GIIB	Gulfstream III	145	214	214
GIV	Gulfstream IV	304	448	448
GV	Gulfstream V	88	130	130
IA1125	Westwind Astra	281	414	414
LEAR25	Lear 25	49	72	72
LEAR35	Lear 35	668	985	985
MU3001	Beechjet 400	1,874	2,762	2,762
SUBTOTAL		**6,120**	**11,928**	**11,928**
Propeller				
BEC58P	Beech Baron	13,605	21,397	21,397
C130	C130 Hercules	50	75	75
CNA172	Cessna 172	5,339	7,869	7,869
CNA182	Cessna 182	2,912	4,291	4,291
CNA206	Cessna 206	7,077	10,430	10,430
CNA208	Cessna 208	1,676	2,471	2,471
CNA20T	Cessna 206 Turbo	2,462	3,629	3,629
CNA441	Cessna Conquest	1,851	2,729	2,729
DHC6	Dash 6	3,883	5,723	5,723
DHC830	Bombardier Q400	3,510	5,110	5,110
GASEPF	Single Engine Piston-Fixed Pitch	21,922	36,091	36,091
GASEPV	Single Engine Piston-Variable Pitch	12,737	20,391	20,391
OV10A	Rockwell Bronco	742	1,093	1,093
PA30	Piper Twin Comanche	72	106	106
PA31	Piper Navajo	359	530	530
SD330	Shorts 330 (Piaggio P190)	2,457	3,621	3,621
SUBTOTAL		**80,654**	**125,556**	**125,556**

Table 3.10-12
AIRCRAFT OPERATIONS AND FLEET MIX – 2009 AND 2015 (cont.)

INM Category/Aircraft		2009	2015	
	Aircraft Description		**Without Proposed Project**	**With Proposed Project**
Helicopter				
A109	Augusta 109	924	1,361	1,361
B222	Bell 222	43	63	63
B407	Bell 407	866	1,276	1,276
EC130	Eurocopter 130	43	63	63
R44	Robinson 44	1,938	2,856	2,856
S70	Sikorsky Blackhawk	72	106	106
SUBTOTAL		**3,886**	**5,725**	**5,725**
TOTAL OPERATIONS		**90,660**	**143,209**	**143,209**

SOURCE: Mead & Hunt 2011
PREPARED BY: MGA/L&B, 2011

Table 3.10-13
2015 CNEL EXPOSURE AREA IN ACRES /a/

Contour CNEL (dB)	2009	2015 Without Proposed Project	2015 With Proposed Project
55 – 60	1,006	1,450	1,421
60 – 65	398	565	550
65 – 70	159	224	219
70 – 75	71	93	98
75 +	50	72	74
55 CNEL and greater	**1,684**	**2,404**	**2,362**

/a/ Acres are rounded to the nearest full acre

SOURCE: MGA/L&B, 2011
PREPARED BY: MGA/L&B, 2011

acreage encompassed within the 55-70 dB CNEL to the north by roughly 122 acres, but will reduce the acreage encompassed within the 55-70 dB CNEL to the south by approximately 175 acres, for an overall decrease in the 55-70 dB CNEL contours. For this reason, the 55-70 dB CNEL contour for the Proposed Project is smaller than the 55-70 dB CNEL for Without Proposed Project. **Figure 3.10-6** shows the change in area (acres) of the 55, 60, and 65 dB CNEL between the 2015 Without Proposed Project and the Proposed Project.

The modeled noise levels at the receptor locations for the Proposed Project in 2015 are shown in **Table 3.10-14**. For comparison purposes, the existing conditions and the 2015 Without Proposed Project noise levels also are included.