This section provides a general description of the existing noise sources in the Plan Area vicinity, a discussion of the regulatory setting, and identifies potential noise impacts associated with the proposed project. Specific Plan impacts are evaluated relative to applicable noise level criteria and to the existing ambient noise environment. Mitigation measures have been identified for significant noise-related impacts. This section is based on the *West Area Specific Plan Noise Impact Study* completed for the project (MD Acoustics, September 2020), which can be found in **Appendix F**.

Comments were received during the public review period or scoping meeting for the Notice of Preparation regarding this topic from the following: Cathy Caples (dated August 1, 2019). Cathy Caples noted that, in addition to traffic noise, residents in the area hear gunfire from the Sheriff's Gun Range; however, no specific-concerns were expressed. The comments related to this topic are addressed within this section; see Impact 3.11-1 regarding traffic noise and Impact 3.11-4 regarding stationary noise. Full comments received are included in **Appendix A**.

3.11.1 ENVIRONMENTAL SETTING

KEY TERMS

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given area consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, defined as ten times the logarithm of the ratio of the sound pressure squared over the reference pressure squared.
CNEL	Community noise equivalent level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic acoustic signal, expressed in cycles per second or Hertz.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.

L_{max} The highest root-mean-square (RMS) sound level measured over a given period of time.

$L_{(n)}$ The sound level exceeded a described percentile over a measurement period. For instance, an hourly L_{50} is the sound level exceeded 50 percent of the time during the one hour period.

Loudness A subjective term for the sensation of the magnitude of sound.

Noise Unwanted sound.

SEL Sound exposure levels. A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy into a one-second event.

FUNDAMENTALS OF ACOUSTICS

Acoustics is the science of sound. Sound may be thought of as mechanical energy of a vibrating object transmitted by pressure waves through a medium to human (or animal) ears. If the pressure variations occur frequently enough (at least 20 times per second), then they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second or Hertz (Hz).

Noise is a subjective reaction to different types of sounds. Noise is typically defined as (airborne) sound that is loud, unpleasant, unexpected or undesired, and may therefore be classified as a more specific group of sounds. Perceptions of sound and noise are highly subjective from person to person.

Measuring sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel scale was devised. The decibel scale uses the hearing threshold (20 micropascals), as a point of reference, defined as 0 dB. Other sound pressures are then compared to this reference pressure, and the logarithm is taken to keep the numbers in a practical range. The decibel scale allows a million-fold increase in pressure to be expressed as 120 dB, and changes in levels (dB) correspond closely to human perception of relative loudness.

The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives sound. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels, but are expressed as dB, unless otherwise noted.

The decibel scale is logarithmic, not linear. In other words, two sound levels 10 dB apart differ in acoustic energy by a factor of 10. When the standard logarithmic decibel is A-weighted, an increase

of 10 dBA is generally perceived as a doubling in loudness. For example, a 70 dBA sound is half as loud as an 80 dBA sound, and twice as loud as a 60 dBA sound.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), which corresponds to a steady-state A weighted sound level containing the same total energy as a time varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptor, L_{dn}, and shows very good correlation with community response to noise.

The day/night average level (L_{dn}) is based upon the average noise level over a 24-hour day, with a +10 decibel weighing applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to L_{dn}, but includes a +5 dB penalty for evening noise. Table 3.11-1 lists several examples of the noise levels associated with common situations.

TABLE 3.11-1: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	*NOISE LEVEL (DBA)*	*COMMON INDOOR ACTIVITIES*
--	--110--	Rock Band
Jet Fly-over at 300 m (1,000 ft)	--100--	--
Gas Lawn Mower at 1 m (3 ft)	--90--	--
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	--80--	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower, 30 m (100 ft)	--70--	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	--60--	Normal Speech at 1 m (3 ft)
Quiet Urban Daytime	--50--	Large Business Office Dishwasher in Next Room
Quiet Urban Nighttime	--40--	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	--30--	Library
Quiet Rural Nighttime	--20--	Bedroom at Night, Concert Hall (Background)
	--10--	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	--0--	Lowest Threshold of Human Hearing

SOURCE: CALTRANS, TECHNICAL NOISE SUPPLEMENT, TRAFFIC NOISE ANALYSIS PROTOCOL. NOVEMBER 2009.

EFFECTS OF NOISE ON PEOPLE

The effects of noise on people can be placed in three categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction;
- Interference with activities such as speech, sleep, and learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers in industrial plants can experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise or the corresponding reactions of annoyance and dissatisfaction. A wide variation in individual thresholds of annoyance exists and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way it compares to the existing environment to which one has adapted: the so-called ambient noise level. In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a 1 dBA change cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference;
- A change in level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10 dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

Stationary point sources of noise – including stationary mobile sources such as idling vehicles – attenuate (lessen) at a rate of approximately 6 dB per doubling of distance from the source, depending on environmental conditions (i.e. atmospheric conditions and either vegetative or manufactured noise barriers, etc.). Widely distributed noises, such as a large industrial facility spread over many acres, or a street with moving vehicles, would typically attenuate at a lower rate.

EXISTING NOISE LEVELS

Four long-term 24-hour noise measurements and 12 short-term noise measurements were conducted throughout the Plan Area to document the existing noise environment. Noise measurement locations are shown in Figure 3.11-1.

Short-Term Noise Measurements

The results of the 12 short-term noise measurement are presented below in Table 3.11-2. The measured noise levels within the Plan Area range between 54.4 and 74.8 dBA L_{eq}. The primary source of ambient noise included vehicle noise associated with surface streets and SR 99, as well as the existing rail. Secondary noise sources included typical residential activities and landscaping equipment. Field notes and meter output are provided in the *Noise Impact Study* found in **Appendix F**.

TABLE 3.11-2: SHORT-TERM NOISE MEASUREMENT SUMMARY

LOCATION	APPROX. ADDRESS	TIME	A-WEIGHTED SOUND LEVEL (DBA)						
			L_{EQ}	L_{MAX}	L_{MIN}	L_2	L_8	L_{25}	L_{50}
1	Herndon Ave./ N. Parkway Dr.	9:28 AM	67.6	78.3	54.5	74.7	71.3	68.0	65.6
2	N. Bryan Ave./ W. Shaw Ave.	9:48 AM	69.5	84.1	40.9	78.3	75.8	69.4	60.4
3	N. Polk Ave./ W. Gettysburg Ave.	10:15 AM	61.5	82.5	41.3	68.1	62.2	58.8	54.2
4	N. Bryan Ave./ W. Ashlan Ave.	10:32 AM	54.4	69.5	37.8	63.1	58.4	53.7	50.0
5	N. Polk Ave./ W. Ashlan Ave.	12:13 PM	64.6	86.5	45.4	71.6	67.7	64.3	60.8
6	N. Dakota Ave./ W. Brawley Ave.	2:19 PM	74.8	99.8	50.2	79.2	72.6	67.5	64.3
7	N. Grantland Ave./ W. Shields Ave.	12:38 PM	72.8	93.4	37.5	81.4	74.7	65.0	56.2
8	N. Polk Ave./ W. Shields Ave.	12:54 PM	66.1	86.3	51.5	75.5	70.1	62.6	58.9
9	N. Blythe Ave./ W. Shields Ave.	1:09 PM	64.4	79.9	48.1	73.5	68.9	63.4	59.5
10	N. Bryan Ave./ W. Clinton Ave.	1:26 PM	59.6	79.5	31.9	70.4	61.6	52.7	43.8
11	N. Cornelia Ave./ W. Clinton Ave.	1:42 PM	65.8	85.0	44.7	73.4	68.7	64.7	60.4
12	N. Marks Ave./ W. Clinton Ave.	2:00 PM	68.8	85.2	55.2	75.9	72.7	69.6	65.6

SOURCE: MD ACOUSTICS, 2020.

Long-Term Noise Measurements

Four long-term noise measurements (24 consecutive hours) were taken in order to document the Community Noise Equivalent Level (CNEL) at different locations throughout the Plan Area. The results of the long-term noise measurement are presented below in Table 3.11-3, which outlines the daytime (7AM to 7PM), evening (7PM to 10PM), and nighttime (10PM to 7AM) Leq levels at each location. These represent the average level over each time period (day/evening/night).

As shown in Table 3.11-3, the measured CNEL ranged between 60.5 and 70.2 dBA, and the primary noise source was vehicle traffic. Field notes and meter output are provided in the *West Area Specific Plan Noise Impact Study* found in **Appendix F**.

TABLE 3.11-3: LONG-TERM NOISE MEASUREMENT SUMMARY

LOCATION	APPROX. ADDRESS	DATE	DESCRIPTION	A-WEIGHTED SOUND LEVEL (DBA)			
				DAY-TIME L_{EQ}	EVENING L_{EQ}	NIGHT-TIME L_{EQ}	CNEL
LT1	N. Grantland Ave./W. Barstow Ave.	6/3-6/4	Vehicle traffic on N. Valentine Ave. and SR 99	58.8	56.1	52.7	60.7
LT2	N. Valentine Ave./W. Shields Ave.	6/3-6/4	Vehicle traffic on N. Grantland Ave. and W. Barstow Ave.	65.4	62.1	63.4	70.8
LT3	N. Blythe Ave./W. Ashlan Ave.	6/4-6/5	Vehicle traffic on N. Blythe Ave. and W. Ashlan Ave.	67.3	65.5	61.5	69.1
LT4	N. Hayes Ave./W. Ashlan Ave.	6/3-6/4	Vehicle traffic on N. Hayes Ave. and W. Ashlan Ave.	65.8	61.3	58.6	67.1

SOURCE: MD ACOUSTICS, 2020.

EXISTING NOISE ENVIRONMENT

Existing land uses within the Plan Area include single and multiple family residential development, commercial, recreational, and industrial land uses. Noise sources associated with existing land uses include residential maintenance, parking lot noise, heating and cooling system (HVAC) noise, property maintenance noise, trash truck noise, loading and unloading noise, and recreational noise.

Roadway Noise

The primary noise source in the community is vehicle traffic traveling on surface streets and on State Route (SR) 99. Long-term (24-hour) and short-term (10-minute) noise measurements were taken at 16 locations throughout the Plan Area, as shown in Figure 3.11-1. Existing modeled and measured noise levels associated with acoustically significant roadways within the Plan Area are shown on Figure 3.11-2, as well as in Table 3.11-4 below. The modeled noise levels do not take into account factors such as existing buildings, walls, etc. that may reduce or in some cases, amplify noise sources. The measured noise levels do take into account existing structures as well as other noise sources. It should be noted that the road segment modeling assumptions for the existing exterior noise levels found in Table 3.11-4 can be found within the *West Area Specific Plan Noise Impact Study* found in **Appendix F**.

TABLE 3.11-4: EXISTING EXTERIOR NOISE LEVELS ALONG ROADWAYS (DBA, CNEL)

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
SR 99	W. Herndon Ave to W. Shaw Ave	83	695	1,497	3,225	6,948
SR 99	W. Shaw Ave to W. Ashlan Ave	82	672	1,447	3,118	6,718
SR 99	W. Ashlan Ave to W. Dakota Ave	84	826	1,780	3,834	8,261

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
SR 99	W. Dakota Ave to W. Shields Ave	84	821	1,768	3,810	8,208
SR 99	W. Shields Ave to W. Clinton Ave	82	615	1,324	2,852	6,145
W. Herndon Ave	N. Garfield Ave to N. Parkway Drive	No Data	No Data	No Data	No Data	No Data
W. Bullard Ave	N Garfield Ave to N. Grantland Ave	48	3	7	16	33
W. Bullard Ave	N. Grantland Ave to N. Bryan Ave	55	10	21	44	96
W. Bullard Ave	N. Bryan Ave to SR 99	23	0	0	0	1
W. Barstow Ave	N Garfield to N. Grantland Ave	53	8	17	37	79
W. Barstow Ave	N. Grantland Ave to N. Bryan Ave	49	4	9	19	41
W. Barstow Ave	N. Bryan Ave to N. Contessa Ave	No Data	No Data	No Data	No Data	No Data
W. Barstow Ave	N. Contessa Ave to N. Island Waterpark Drive	No Data	No Data	No Data	No Data	No Data
W. Shaw Ave	N Garfield Ave to N. Grantland Ave	59	19	41	89	193
W. Shaw Ave	N. Grantland Ave to N. Bryan Ave	60	22	46	100	215
W. Shaw Ave	N. Bryan Ave to 1,300 ft east of N. Hayes Ave	61	24	51	110	238
W. Shaw Ave	1,300 ft east of N. Hayes Ave to N. Polk Ave	63	36	77	166	358
W. Shaw Ave	N. Polk Ave to SR 99	66	57	124	266	574
W. Gettysburg Ave	1,300 ft west of N. Bryan Ave to Bryan Ave	51	5	11	25	53
W. Gettysburg Ave	N. Bryan Ave to N. Hayes Ave	52	7	14	31	67
W. Gettysburg Ave	N. Hayes Ave to N. Polk Ave	53	7	16	34	73
W. Gettysburg Ave	N. Polk Ave to N. Barcus	54	8	17	37	80
W. Ashlan Ave	N. Garfield to N. Grantland	No Data	No Data	No Data	No Data	No Data
W. Ashlan Ave	N. Grantland Ave to N. Bryan Ave	59	18	38	82	177

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
W. Ashlan Ave	N. Bryan Ave to N. Hayes Ave	56	12	27	58	124
W. Ashlan Ave	N. Hayes Ave to N. Polk Ave	55	9	20	44	94
W. Ashlan Ave	N. Polk Ave to N. Cornelia Ave	60	20	44	94	203
W. Ashlan Ave	N. Cornelia Ave to N. Blythe Ave	64	38	81	174	376
W. Ashlan Ave	N. Blythe Ave to SR 99	65	48	103	223	480
W. Dakota Ave	N. Hayes Ave to N. Barcus Ave	53	7	16	34	73
W. Dakota Ave	N. Barcus Ave to N. Polk Ave	56	11	24	51	109
W. Dakota Ave	N. Polk Ave to N. Cornelia Ave	57	14	30	65	139
W. Dakota Ave	N. Cornelia Ave to N. Blythe Ave	56	12	27	57	123
W. Dakota Ave	N. Blythe Ave to N Brawley Ave	55	10	22	47	101
W. Dakota Ave	N Brawley Ave to N. Parkway Drive	54	8	18	39	84
W. Shields Ave	N. Garfield Ave to Grantland Ave	54	9	20	42	91
W. Shields Ave	N. Grantland Ave to N. Bryan Ave	54	9	20	43	92
W. Shields Ave	N. Bryan Ave to N. Hayes Ave	56	11	24	51	109
W. Shields Ave	N. Hayes Ave to N. Polk Ave	55	10	22	48	103
W. Shields Ave	N. Polk Ave to N. Dante Ave	58	17	36	78	169
W. Shields Ave	N. Dante Ave to N. Cornelia Ave	58	17	36	78	169
W. Shields Ave	N. Cornelia Ave to N. Blythe Ave	57	13	28	60	130
W. Shields Ave	N. Blythe Ave to N. Brawley Ave	57	13	27	59	126
W. Shields Ave	N Brawley Ave to N. Valentine Ave	58	15	33	70	152
W. Shields Ave	N. Valentine Ave to N. Marks Ave	58	17	37	79	170
W. Clinton Ave	N. Grantland Ave to N. Bryan Ave	48	3	7	15	32

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
W. Clinton Ave	N. Bryan Ave to N. Hayes Ave	50	5	10	21	46
W. Clinton Ave	N. Hayes Ave to N. Polk Ave	52	6	13	28	60
W. Clinton Ave	N. Polk Ave to 1,900 ft east of N. Polk Ave	52	6	13	28	60
W. Clinton Ave	1,900 ft east of N. Polk Ave to N. Cornelia Ave	59	18	40	86	184
W. Clinton Ave	N. Cornelia Ave to N. Milburn Ave	63	34	74	159	343
W. Clinton Ave	N. Milburn Ave to N. Blythe Ave	62	29	62	133	286
W. Clinton Ave	N. Blythe Ave to N Sonora Ave	65	44	95	204	440
W. Clinton Ave	N. Sonora Ave to N Brawley Ave	63	37	79	170	367
W. Clinton Ave	N Brawley Ave to N. Knoll Ave	64	38	82	177	381
W. Clinton Ave	N. Knoll Ave to 850 ft east of N. Knoll Ave	64	37	81	174	374
W. Clinton Ave	850 ft east of N. Knoll Ave to N. Valentine Ave	61	27	58	124	268
W. Clinton Ave	N. Valentine Ave to N. Marks Ave	64	41	88	190	410
W. Clinton Ave	N. Marks Ave to W. Vassar Ave	68	73	158	340	733
N Garfield Ave	W. Herndon Ave to W. Bullard Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Bullard Ave to W. Barstow Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Barstow Ave to 1,000 ft south of W. Barstow Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	1,000 ft south of W. Barstow Ave to W. Shaw Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Shaw Ave to W. Gettysburg Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Gettysburg to W. Ashlan Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Ashlan Ave to W. Dakota Ave	No Data	No Data	No Data	No Data	No Data
N Garfield Ave	W. Dakota Ave to W. Shields Ave	No Data	No Data	No Data	No Data	No Data

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
N. Parkway Drive	N Herndon Ave to W. Herndon Ave	No Data	No Data	No Data	No Data	No Data
N. Grantland Ave	N. Parkway Drive to W. Bullard Ave	No Data	No Data	No Data	No Data	No Data
N. Grantland Ave	W. Bullard Ave to W. Barstow Ave	62	31	68	146	315
N. Grantland Ave	W. Barstow Ave to W. Shaw Ave	62	29	62	134	290
N. Grantland Ave	W. Shaw Ave to W. Gettysburg Ave	57	14	31	67	144
N. Grantland Ave	W. Gettysburg Ave to W. Ashlan Ave	60	21	44	95	205
N. Grantland Ave	W. Ashlan Ave to W Dakota Ave	59	17	37	80	171
N. Grantland Ave	W. Dakota Ave to W. Shields Ave	No Data	No Data	No Data	No Data	No Data
N. Grantland Ave	W Shields Ave to W. Clinton Ave	57	14	31	66	142
N. Bryan Ave	W. Shaw Ave to W. Santa Ana Ave	54	8	18	39	84
N. Bryan Ave	W. Santa Ana Ave to W. Gettysburg Ave	54	8	18	39	84
N. Bryan Ave	W. Gettysburg Ave to W. Ashlan Ave	58	15	32	69	149
N. Bryan Ave	W. Ashlan Ave to W. Dakota Ave	55	10	22	47	102
N. Bryan Ave	W. Dakota Ave to W Shields Ave	53	7	15	32	68
N. Bryan Ave	W Shields Ave to W. Clinton Ave	48	4	8	16	35
N. Hayes Ave	W. Shaw Ave to W. Santa Ana Ave	57	14	30	64	138
N. Hayes Ave	W. Santa Ana Ave to W. Gettysburg Ave	57	14	29	63	136
N. Hayes Ave	W. Gettysburg Ave to W. Swift Ave	55	10	21	46	100
N. Hayes Ave	W. Swift Ave to W. Ashlan Ave	52	7	14	31	67
N. Hayes Ave	W. Ashland Ave to W. Dakota Ave	54	8	18	39	84
N. Hayes Ave	W. Dakota Ave to 1,300 ft South of W. Dakota Ave	53	8	17	36	78

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
N. Hayes Ave	1,300 ft South of W. Dakota Ave to W Shields Ave	56	12	25	54	116
N. Hayes Ave	W Shields Ave to W. Clinton Ave	52	7	14	30	66
N. Polk Ave	North of W. Shaw Ave	60	22	47	102	219
N. Polk Ave	W. Shaw Ave to W. Acacia Ave	62	31	66	142	307
N. Polk Ave	W. Acacia Ave to W. Gettysburg Ave	62	31	67	145	312
N. Polk Ave	W. Gettysburg Ave to W. Ashlan Ave	58	17	36	78	167
N. Polk Ave	W. Ashland Ave to W. Griffith Way	59	18	40	85	184
N. Polk Ave	W. Griffith Way to W. Dakota Ave	61	26	55	119	257
N. Polk Ave	W. Dakota Ave to W Shields Ave	58	17	36	78	168
N. Polk Ave	W Shields Ave to W. Clinton Ave	57	14	30	65	141
N. Cornelia Ave	N. Parkway Drive to W. Gettysburg Ave	60	22	48	104	223
N. Cornelia Ave	W. Gettysburg to W. Ashlan Ave	60	22	48	104	223
N. Cornelia Ave	W. Ashland Ave to W. Bellaire Way	62	27	59	128	275
N. Cornelia Ave	W. Bellaire Way to W. Dakota Ave	62	27	59	128	275
N. Cornelia Ave	W. Dakota Ave to W Shields Ave	58	15	33	70	152
N. Cornelia Ave	W Shields Ave to W. Clinton Ave	60	22	47	102	220
N. Blythe Ave	W. Ashlan Ave to W. Dakota Ave	60	21	45	96	207
N. Blythe Ave	W. Dakota Ave to W Shields Ave	57	13	29	62	133
N. Blythe Ave	W Shields Ave to W. Clinton Ave	57	14	29	63	136
N Brawley Ave	N. Parkway Drive to W. Dakota Ave	58	17	36	77	165
N Brawley Ave	W. Dakota Ave to W. Dayton Ave	58	16	35	75	161
N Brawley Ave	W. Dayton Ave to W. Cortland Ave	61	24	52	111	240

ROADWAY	SEGMENT	DISTANCES TO CONTOUR				
		@100 ft	70	65	60	55
N Brawley Ave	W. Cortland Ave to W. Shields Ave	58	16	35	75	161
N Brawley Ave	W Shields Ave to W. Clinton Ave	58	16	33	72	155
N. Valentine Ave	N. Parkway Drive to W Shields Ave	54	9	19	41	89
N. Valentine Ave	W Shields Ave to W. Clinton Ave	53	8	17	36	77
N. Marks Ave	W Princeton Ave to W. Clinton Ave	59	20	44	95	205

NOTES:
1. EXTERIOR NOISE LEVELS CALCULATED AT 5-FEET ABOVE GROUND.
2. NOISE LEVELS CALCULATED FROM CENTERLINE OF SUBJECT ROADWAY.
3. REFER TO APPENDIX C OF APPENDIX F FOR PROJECTED NOISE LEVEL CALCULATIONS.
4. THE PROJECTED NOISE LEVELS AT 100 FT ARE THEORETICAL AND DO NOT TAKE INTO CONSIDERATION THE EFFECT OF TOPOGRAPHY, NOISE BARRIERS, STRUCTURES OR OTHER FACTORS WHICH WILL REDUCE THE ACTUAL NOISE LEVEL IN THE OUTDOOR LIVING AREAS. THESE FACTORS CAN REDUCE THE ACTUAL NOISE LEVELS BY 5-10 DBA FROM WHAT IS SHOWN IN THE TABLE. THEREFORE, THE LEVELS THAT ARE SHOWN ARE FOR COMPARATIVE PURPOSES ONLY TO SHOW THE DIFFERENCE IN PROJECTED NOISE LEVELS WITHOUT AND WITH THE PROJECT.
SOURCE: MD ACOUSTICS, 2020.

As shown in Table 3.11-4 and Figure 3.11-2, areas in the City that currently experience sound levels greater than 60 dBA L_{dn} are typically near major vehicular traffic corridors. Highway traffic noise levels typically depend on three factors: (1) the volume of traffic, (2) the average speed of traffic, and (3) the vehicle mix (i.e., the percentage of trucks versus automobiles in the traffic flow). Vehicle noise includes noises produced by the engine, exhaust, tires, and wind generated by taller vehicles. Other factors that affect the perception of traffic noise include the distance from the highway, terrain, vegetation, and natural and structural obstacles. While tire noise from automobiles is generally located at ground level, some truck noise sources may emanate from 12 feet or more above the ground.

Vehicle traffic generated noise associated with SR 99 is the dominant noise source in the eastern portion of the Plan Area with average daily vehicle trips (ADTs) ranging between 77,000-107,000 adjacent to the Plan Area. Existing modeled noise contours shown in Figure 3.11-2 show that traffic noise associated with SR 99 dominates the noise environment of the easternmost portion of the Plan Area. Most noise sensitive land uses adjacent to SR 99 are shielded by existing sound walls, topography, or buildings, however, the attenuation provided by them is not represented in the noise contour map.

Rail Noise

Noise associated with the existing Union Pacific Railroad (UPRR) line that generally runs parallel to SR 99 also contributes to noise in the Plan Area. The Union Pacific Railroad extends in a southeast/northwest direction ranging between 320 and 2,100 feet east of the project area. Based on count data available provided by the Federal Railroad Administration (FRA 2020) fourteen train

trips per day (split evenly between daytime and nighttime hours) utilize the rail lines located east of the project area and SR 99 and north of West Ashlan Avenue. There are existing residential land uses located within the project area as close as 380 feet to the rail lines north of West Ashlan Avenue and 380 feet from the rail lines south of West Ashlan Avenue. There is a rail yard east of SR 99 that extends from approximately 450 feet north of Clinton Avenue to West Ashlan Avenue. Noise level contours associated with the UPRR are shown in Figure 3.11-3.

Airport/Aircraft Noise

There are no airports located within the Plan Area and the Plan Area is not located within any airport noise contours (City of Fresno, 2014). The Plan Area is, however, affected by fly-over noise associated with the Fresno Yosemite International airport, the Fresno-Chandler Downtown Airport, and the Sierra Sky Park Airport. Commercial jet aircraft operations are limited to the Fresno Yosemite International Airport. The Air National Guard is also stationed there and operates military jets and other aircraft. Private and commercial operations with smaller aircraft use the Fresno Chandler Downtown Airport, while only small private aircraft use the Sierra Sky Park Airport.

VIBRATION SOURCES IN THE PLAN AREA

The main sources of vibration in the project area are related to vehicles, rail, and construction. Typical roadway traffic, including heavy trucks, rarely generates vibration amplitudes high enough to cause structural or cosmetic damage. However, there have been cases in which heavy trucks traveling over potholes or other discontinuities in the pavement have caused vibration high enough to result in complaints from nearby residents.

3.11.2 REGULATORY SETTING

FEDERAL

Noise Control Act of 1972

The Federal Office of Noise Abatement and Control (ONAC) originally was tasked with implementing the Noise Control Act. However, it was eventually eliminated leaving other federal agencies and committees to develop noise policies and programs. Some examples of these agencies are as follows:

- The Department of Transportation (DOT) assumed a significant role in noise control through its various agencies.
- The Federal Aviation Agency (FAA) is responsible to regulate noise from aircraft and airports.
- The Federal Highway Administration (FHWA) is responsible to regulate noise from the interstate highway system.
- The Occupational Safety and Health Administration (OSHA) is responsible for the prohibition of excessive noise exposure to workers.

The federal government advocates that local jurisdiction use their land use regulatory authority to arrange new development in such a way that "noise sensitive" uses are either prohibited from being constructed adjacent to a highway, or alternatively that the developments are planned and constructed in such a manner that potential noise impacts are minimized.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by the transportation source, the City is restricted to regulating the noise generated by the transportation system through nuisance abatement Codes and land use planning.

STATE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) Guidelines, Appendix G, indicate that a significant noise impact may occur if a project exposes persons to noise or vibration levels in excess of local general plans or noise ordinance standards, or cause a substantial permanent or temporary increase in ambient noise levels. CEQA standards are discussed more below under the Thresholds of Significance criteria section.

Title 24 of the Uniform Building Code

Section 1206.4 of the California Building Code (2019), Title 24, Part 2, Chapter 12 (Interior Environment), establishes an interior noise criteria of 45 dBA CNEL for "dwelling units". Per California Building Code, Title 24, Part 2, Chapter 2 (Definitions), a residential dwelling unit is intended to be used as a residence that is primarily long-term in nature. Residential dwelling units do not include transient lodging, inpatient medical care, licensed long-term care, and detention or correctional facilities.

California Building Code (2019), Title 24, Part 2, Chapter 5 (Nonresidential Mandatory Measures), applies to all proposed buildings that people may occupy but are not residential dwelling units, with the exception of factories, stadiums, storage, enclosed parking structures, and utility buildings. Section 5.507.4.1 requires wall and roof-ceiling assemblies exposed to the noise source making up the building, or addition envelope or altered envelope, shall meet a composite Sound Transmission Class (STC) rating of at least 50 or a composite Outdoor to Indoor Transmission Class (OITC) rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30.

LOCAL

Fresno General Plan

For the purposes of evaluating noise impacts due to new projects, the objectives and policies of the City of Fresno General Plan Noise Element are used. The Fresno General Plan Noise Element sets forth noise standards for transportation noise sources. Ideally, proposed land uses would be developed in areas where future noise levels due to transportation noise sources (except aircraft) would not exceed those presented in Table 3.11-5. Additionally, the Fresno General Plan Element

also includes standards for stationary noise sources to regulate noise emanating from one property to another, which are presented in Table 3.11-6.

TABLE 3.11-5: TRANSPORTATION (NON-AIRCRAFT) NOISE SOURCES

NOISE SENSITIVE LAND USES	OUTDOOR ACTIVITY AREAS[1,3]	INTERIOR SPACES	
	LDN/CNEL, DB	LDN/CNEL, DB	LEQ DB[2, 4]
Residential	65	45	--
Transient Lodging	65	45	--
Hospitals, Nursing Homes	65	45	--
Theaters, Auditoriums, Music Halls	--	--	35
Churches, Meeting Halls	65	--	45
Office Buildings	--	--	45
Schools, Libraries Museums	--	--	45

NOTES: 1. WHERE THE LOCATION OF OUTDOOR ACTIVITY AREAS IS UNKNOWN OR IS NOT APPLICABLE, THE EXTERIOR NOISE LEVEL STANDARD SHALL BE APPLIED TO THE PROPERTY LINE OF THE RECEIVING LAND USE.
2. EXCLUDES FRONT OR SIDE YARD AREAS, AND FRONT OR SIDE PORCHES. BALCONIES OR ROOF DECKS FACING FRONT AND SIDE YARDS SHALL BE INCLUDED IN DESIGNATED AREAS TO BE PROTECTED FROM NOISE WHERE THESE SPACES ARE USED TO CALCULATE COMPLIANCE WITH REQUIRED OUTDOOR LIVING AREA AS REQUIRED BY ADOPTED DEVELOPMENT STANDARDS.
3. RESIDENTIAL AND NOISE SENSITIVE USES LOCATED ALONG BUS RAPID TRANSIT CORRIDORS OR WITHIN ACTIVITY CENTERS AS IDENTIFIED IN THE CITY OF FRESNO GENERAL PLAN, ARE EXEMPT FROM EXTERIOR NOISE STANDARDS WHERE IT IS DETERMINED APPLICATION OF NOISE MITIGATION MEASURES WILL BE DETRIMENTAL TO THE REALIZATION OF THE GENERAL PLAN'S MIXED USE POLICIES. INTERIOR NOISE LEVEL STANDARDS SHALL STILL APPLY.
4. AS DETERMINED FOR A TYPICAL WORST-CASE HOUR DURING PERIODS OF USE.
SOURCE: CITY OF FRESNO GENERAL PLAN NOISE ELEMENT (TABLE 9-2), 2014.

TABLE 3.11-6: STATIONARY NOISE SOURCE STANDARDS

	DAYTIME (7:00 AM – 10:00 PM)	NIGHTTIME (10:00 PM – 7:00 AM)
Hourly Equivalent Sound Level (Leq), dBA	50	45
Maximum Sound Level (Lmax), dBA	70	60

NOTES: 1. THE DEPARTMENT OF DEVELOPMENT AND RESOURCE MANAGEMENT DIRECTOR, ON A CASE-BY-CASE BASIS, MAY DESIGNATE LAND USES OTHER THAN THOSE SHOWN IN THIS TABLE TO BE NOISE-SENSITIVE, AND MAY REQUIRE APPROPRIATE NOISE MITIGATION MEASURES.
2. AS DETERMINED AT OUTDOOR ACTIVITY AREAS. WHERE THE LOCATION OF OUTDOOR ACTIVITY AREAS IS UNKNOWN OR NOT APPLICABLE, THE NOISE EXPOSURE STANDARD SHALL BE APPLIED AT THE PROPERTY LINE OF THE RECEIVING LAND USE. WHEN AMBIENT NOISE LEVELS EXCEED OR EQUAL THE LEVELS IN THE TABLE, MITIGATION SHALL ONLY BE REQUIRED TO LIMIT NOISE TO THE AMBIENT PLUS FIVE DBA.
SOURCE: CITY OF FRESNO GENERAL PLAN NOISE ELEMENT, 2014.

The Noise Element outlines the following objectives and policies which are pertinent to the project. This list does not include all noise-related policies, but provides policies which are relevant to the project.

NOISE ELEMENT

Objective NS-1: Protect the citizens of the City from the harmful effects of exposure to excessive noise.

Policy NS-1-a: Desirable and Generally Acceptable Exterior Noise Environment. Establish 65 dB Ldn or CNEL as the standard for the desirable maximum average exterior noise levels for defined usable exterior areas of residential and noise-sensitive uses for noise, but designate 60 dB Ldn or CNEL (measured at the property line) for noise generated by stationary sources impinging upon residential and noise-sensitive uses. Maintain 65 dB Ldn or CNEL as the maximum average exterior noise levels for non-sensitive commercial land uses, and maintain 70 dB Ldn or CNEL as maximum average exterior noise level for industrial land uses, both to be measured at the property line of parcels where noise is generated which may impinge on neighboring properties.

Commentary: The noise ordinance will define usable exterior areas for single family and multiple family residential and noise sensitive uses to include rear yards and other outdoor areas intended to accommodate leisure or active use, excluding front or side yard areas, and front or side porches. Balconies or roof decks facing from side yards shall be included in designated areas to be protected from noise where these spaces are used to calculate compliance with required outdoor living area as required by adopted development standards.

Policy NS-1b: Conditionally Acceptable Exterior Noise Exposure Range. Establish conditionally acceptable noise exposure level range for residential and other noise sensitive uses to be 65 dB Ldn or require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the desirable and conditionally acceptable exterior noise level and the required interior noise level standards set in Table 9-2.

Policy NS-1c: Generally Unacceptable Exterior Noise Exposure Range. Establish the exterior noise exposure of greater than 65 dB Ldn or CNEL to be generally unacceptable for residential or other noise sensitive uses for noise generated by sources in Policy NS-1-a, and study alternative less noise sensitive uses for these areas if otherwise appropriate. Require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the generally acceptable exterior noise and the required 45 dB interior noise level standards et in Table 9-2 as conditions of permit approval.

Policy NS-1i: Mitigation of New Developments. Require an acoustical analysis where new development of industrial, commercial or other noise generating land uses (including transportation facilities such as roadways, railroads, and airports) may result in noise level that exceed the noise level exposure criteria established in Tables 9-2 and 9-3 to determine impacts, and require developers to mitigate these impacts in conformance with tables 9-2 and 9-3 as a condition of permit approval through appropriate means.

Noise mitigation measures may include:

- The screening of noise sources such as parking and loading facilities, outdoor activities, and mechanical equipment;
- providing increased setbacks for noise sources from adjacent dwellings;

- Installation of walls and landscaping that serve as noise buffers;
- Installation of soundproofing materials and double-glazed windows; and
- Regulating operations, such as hours of operation, including deliveries and trash pickup.

Alternative acoustical designs that achieve the prescribed noise level reduction may be approved by the City, provided a qualified Acoustical Consultant submits information demonstrating that the alternative designs will achieve and maintain the specific targets for outdoor activity areas and interior spaces. As a last resort, developers may propose to construct noise walls along roadways when compatible with aesthetic concerns and neighborhood character.

Policy NS-1j: Significance Threshold. Establish, as a threshold of significance for the City's environmental review process, that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB Ldn or CNEL, or more above the ambient noise limits established in this General Plan Update.

Commentary: When an increase in noise would result in a "Significant" impact (increase of three dBA or more) to residents or businesses, then noise mitigation would be required to reduce noise exposure. If the increase in noise is less than three dBA, then the noise impact is considered insignificant and no noise mitigation is needed.

Policy NS-1k: Proposal Review. Review all new public and private development proposals that may potentially be affected by or cause a significant increase in noise levels, per Policy NS-1-i, to determine conformance with the policies of this Noise Element. Require developers to reduce the noise impacts of new development on adjacent properties through appropriate means.

Policy NS-1l: Enforcement. Continue to enforce applicable State Noise Insulation Standards and Uniform Building Code noise requirements, as adopted by the City.

Policy NS-1m: Transportation Related Noise Impacts. For projects subject to the City approval, require that the project sponsor mitigate noise created by new transportation and transportation-related stationary noise sources, including roadway improvement projects, so that resulting noise levels do not exceed the City's adopted standards for noise sensitive land uses.

Policy NS-1n: Best Available Technology. Require new noise sources to use best available control technology to minimize noise emissions.

Commentary: Noise from mechanical equipment can be reduced by soundproofing materials and sound-deadening installation; controlling hours of operation will also reduce noise impacts during the morning or evening.

Policy NS-1o: Sound Wall Guidelines. Acoustical studies and noise mitigation measures for projects shall specify the heights, materials, and design for sound walls and other noise

barriers. Aesthetic considerations shall also be addressed in these studies and mitigation measures such as variable noise barrier heights, a combination of a landscaped berm with wall, and reduced barrier height in combination with increased distance or elevation differences between noise source and noise receptor, with a maximum allowable height of 15 feet. The City will develop guidelines for aesthetic design measures of sound walls, and may commission area wide noise mitigation studies that can serve as templates for acoustical treatment that can be applied to similar situations in the urban area.

Commentary: While acoustical studies need to be site-specific in order to appropriately assess particular settings, having prototypical design measures and noise control templates that can be applied for similar situations and contexts can facilitate infill and other development. These can be provided in this noise report and carried forward into the Specific Plan.

Policy NS-1p: Airport Noise Compatibility. Implement the land use and noise exposure compatibility provisions of the adopted Fresno Yosemite International Airport Land Use Compatibility Plan, the Fresno Chandler Executive Airport Master and Environs Specific Plan, and the Sierra Sky Park Land Use Policy Plan to assess noise compatibility of proposed uses and improvements within airport influence and environs areas.

City of Fresno Noise Ordinance

Article 1 of Chapter 10 of the City's Municipal Code contains the City's Noise Ordinance, which establishes excessive noise guidelines and exemptions. The standards for ambient noise for varying land uses are somewhat generic and are assumed to be overridden by actual noise measurements and modeling of noise sources. Those applicable to this analysis are presented below.

SEC. 10-102. Definitions.

(b) Ambient Noise. “Ambient noise” is the all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far. For the purpose of this ordinance, ambient noise level is the level obtained when the noise level is averaged over a period of fifteen minutes, without inclusion of the offending noise, at the location and time of day at which a comparison with the offending noise is to be made. Where the ambient noise level is less than what is presented in Table 3.11-7 for the applicable type of land use, the sound level presented in Table 3.11-7, shall be deemed to be the ambient noise level for that location.

TABLE 3.11-7: AMBIENT NOISE

DISTRICT	*TIME*	*SOUND LEVEL DECIBELS*
Residential	10:00 PM to 7:00 AM	50
	7:00 PM to 10:00 PM	55
	7:00 AM to 7:00 PM	60
Commercial	10:00 PM to 7:00 AM	60
	7:00 AM to 10:00 PM	65
Industrial	Anytime	70

SOURCE: CITY OF FRESNO MUNICIPAL CODE SECTION 10-102(B)

SEC. 10-105. Excessive Noise Prohibited.

No person shall make, cause, or suffer or permit to be made or caused upon any premises or upon any public street, alley, or place within the city, any sound or noise which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing or working in the area, unless such noise or sound is specifically authorized by or in accordance with this article. The provisions of this section shall apply to, but shall be limited to, the control, use, and operation of the following noise sources:

(a) Radios, musical instruments, phonographs, television sets, or other machines or devices used for the amplification, production, or reproduction of sound or the human voice.

(b) Animals or fowl creating, generating, or emitting any cry or behavioral sound.

(c) Machinery or equipment, such as fans, pumps, air conditioning units, engines, turbines, compressors, generators, motors or similar devices, equipment, or apparatus.

(d) Construction equipment or work, including the operation, use or employment of pile drivers, hammers, saws, drills, derricks, hoists, or similar construction equipment or tools.

SEC. 10-107. Schools, Hospitals, and Churches.

No person shall create any noise on any street, sidewalk, or public place adjacent to any school, institution of learning, or church while the same is in use, or adjacent to any hospital, which noise unreasonably interferes with the workings of such institution or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such street, sidewalk, or public place indicating the presence of a school, church, or hospital.

SEC. 10-109. Exceptions.

(a) Construction, repair or remodeling work accomplished pursuant to a building, electrical, plumbing, mechanical, or other construction permit issued by the city or other governmental agency, or to site preparation and grading, provided such work takes place between the hours of 7:00 a.m. and 10:00 p.m. on any day except Sunday.

(b) Emergency work.

(c) Any acts or acts which are prohibited by any law of the State of California or the United States.

City of Fresno Community Plans

The City of Fresno is divided in to nine Community Plan Areas. The project site is within the West Area Community Plan Area. The West Area Community Plan includes a few land use related policies that encourage good design and avoidance of potential noise issues. These policies are presented below.

Policy W-7-e: All loading spaces shall be located not less than 150 feet from the boundary of any residential property; however, the proximity of loading areas may be reduced when adequate design and operational measures (such as restricted hours for loading activities) are approved to mitigate noise, lights, and other nuisances associated with loading areas, in order to protect adjacent residential uses. In all cases, loading areas shall be screened from view of adjoining property zoned, planned, or approved for residential uses. This screening shall be accomplished by either placing loading docks and areas on the sides of buildings that face away from residential property, or by a combination of landscape planting and a solid masonry wall. Where possible, loading areas should not be visible from, nor take access from, local streets with residential frontage.

Policy W-7-f: Roof-mounted and detached mechanical equipment for commercial and office uses should be screened from view of adjacent residential areas, and acoustically baffled to prevent the noise level rating for the equipment from exceeding the applicable city standard for ambient noise at residential property lines.

3.11.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the project will have a significant impact related to noise if it will result in:

- Generation of a temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies; and/or
- Generation of excessive groundborne vibration or groundborne noise levels.
- For a project located within the vicinity of a private airstrip or 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, the project would expose people residing or working in the project area to excessive noise levels.

Noise Standards

The noise standards applicable to the project include the relevant portions of the City of Fresno General Plan, as described in the Regulatory Setting section above, and the following standards.

Based upon the General Plan Noise and Safety Element, the project will have a significant increase in noise if it exceeds a 3 dB L_{dn}. This is consistent with Table 3.11-8 which is based upon recommendations made by the Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, it has been accepted that they are applicable to all sources of noise described in terms of cumulative noise exposure metrics such as the L_{dn}.

TABLE 3.11-8: SIGNIFICANCE OF CHANGES IN NOISE EXPOSURE

AMBIENT NOISE LEVEL WITHOUT PROJECT, L_{DN}	*INCREASE REQUIRED FOR SIGNIFICANT IMPACT*
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

SOURCE: FEDERAL INTERAGENCY COMMITTEE ON NOISE (FICON).

Vibration Standards

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that in that noise is generally considered to be pressure waves transmitted through air, whereas vibration usually consists of the excitation of a structure or surface. As with noise, vibration consists of an amplitude and frequency. A person's perception to the vibration will depend on their individual sensitivity to vibration, as well as the amplitude and frequency of the source and the response of the system which is vibrating.

Vibration can be measured in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities in inches per second. Standards pertaining to perception as well as damage to structures have been developed for vibration levels defined in terms of peak particle velocities.

The City of Fresno does not establish criteria for vibration impacts. However, the Federal Transit Administration establishes vibration impact thresholds for construction/demolition projects. These thresholds are shown in Table 3.11-9 on the following page.

TABLE 3.11-9: GROUNDBORNE VIBRATION CRITERIA

ARCHITECTURAL DAMAGE BUILDING CATEGORY	*PPV (IN/SEC)*	*LV (VDB)[A]*
I. Reinforced concrete, steel, or timber (no plaster)	0.5	102
II. Engineered concrete and masonry (no plaster)	0.3	98
III. Non-engineered timber and masonry buildings	0.2	94
IV. Buildings extremely susceptible to vibration damage	0.12	90

NOTE: [A] RMS VELOCITY CALCULATED FROM VIBRATION LEVEL (VDB) USING THE REFERENCE OF ONE MICRO-INCH/SECOND.
SOURCE: FEDERAL TRANSIT ADMINISTRATION, TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT, 2006.

Table 3.11-9 indicates that the threshold for damage to structures ranges from 0.2 to 0.5 peak particle velocity in inches per second (in/sec p.p.v). One-half this minimum threshold or 0.1 in/sec p.p.v. is considered a safe criterion that would protect against architectural or structural damage. The general threshold at which human annoyance could also occur is typically noted as 0.1 in/sec p.p.v.

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: Specific Plan implementation could potentially substantially increase mobile noise levels at existing and proposed receptors. (Less than Significant with Mitigation)

EXTERIOR TRAFFIC NOISE IMPACTS – PROPOSED RECEPTORS

Upon future buildout of the Plan Area, the primary noise source in the community will continue to be vehicle traffic traveling on surface streets and on SR 99. Future noise levels associated with acoustically significant roadways within the Plan Area are shown on Figure 3.11-4. Vehicle traffic generated noise associated with SR 99 will continue to be the dominant noise source in the eastern portion of the Plan Area with ADTs ranging between 77,000 and 107,000 adjacent to the Plan Area. Although most noise sensitive land uses adjacent to SR 99 are shielded by existing sound walls, topography or buildings, there are still some noise sensitive land uses where existing plus project plus cumulative noise levels will exceed the City's 60 dBA L_{dn} noise standard. Thus, traffic noise impacts to proposed receptors would be potentially significant.

EXTERIOR TRAFFIC NOISE IMPACTS – EXISTING RECEPTORS

Buildout of the Plan Area will result in substantial increases in ambient noise levels. According to the *West Area Specific Plan Noise Impact Study*, the FHWA Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used to predict noise levels due to the Specific Plan traffic. Traffic volumes for existing conditions were obtained from the traffic data prepared for the Specific Plan. The potential off-site noise impacts caused by the increase in vehicular traffic from the operation of the proposed project on the nearby roadways was calculated by comparing the existing and existing plus project plus cumulative noise levels. Table 3.11-10 compares the existing and existing plus project cumulative noise levels along the Plan Area roadways.

TABLE 3.11-10: CHANGE IN NOISE ALONG ROADWAYS DUE TO THE PROPOSED SPECIFIC PLAN (DBA, CNEL)

ROADWAY	SEGMENT	CNEL AT 100 FEET DBA[2]				
		EXISTING	EXISTING + PROJECT + CUMULATIVE	CHANGE	EXCEEDS COMPATIBILITY CRITERIA	POTENTIALLY SIGNIFICANT IMPACT[4]
SR 99	W. Herndon Ave to W. Shaw Ave	82.6	82.6	0.0	Yes	No
SR 99	W. Shaw Ave to W. Ashlan Ave	82.4	82.4	0.0	Yes	No
SR 99	W. Ashlan Ave to W. Dakota Ave	83.8	83.8	0.0	Yes	No
SR 99	W. Dakota Ave to W. Shields Ave	83.7	83.7	0.0	Yes	No
SR 99	W. Shields Ave to W. Clinton Ave	81.8	83.8	2.0	Yes	No
W. Herndon Ave	N. Garfield Ave to N. Parkway Drive	No Data	No Data	n/a	n/a	n/a

ROADWAY	SEGMENT	CNEL AT 100 FEET DBA[2]				
		EXISTING	EXISTING + PROJECT + CUMULATIVE	CHANGE	EXCEEDS COMPATIBILITY CRITERIA	POTENTIALLY SIGNIFICANT IMPACT[4]
W. Bullard Ave	N Garfield Ave to N. Grantland Ave	47.9	58.3	10.5	No	No
W. Bullard Ave	N. Grantland Ave to N. Bryan Ave	54.7	60.0	5.2	No	No
W. Bullard Ave	N. Bryan Ave to SR 99	No Data	No Data	n/a	n/a	n/a
W. Barstow Ave	N Garfield to N. Grantland Ave	53.5	53.8	0.4	No	No
W. Barstow Ave	N. Grantland Ave to N. Bryan Ave	49.1	61.8	12.7	No	No
W. Barstow Ave	N. Bryan Ave to N. Contessa Ave	No Data	No Data	n/a	n/a	n/a
W. Barstow Ave	N. Contessa Ave to N. Island Waterpark Drive	No Data	No Data	n/a	n/a	n/a
W. Shaw Ave	N Garfield Ave to N. Grantland Ave	59.3	63.7	4.5	No	No
W. Shaw Ave	N. Grantland Ave to N. Bryan Ave	60.0	68.3	8.3	Yes	**Yes**
W. Shaw Ave	N. Bryan Ave to 1,300 ft east of N. Hayes Ave	60.6	68.1	7.5	Yes	**Yes**
W. Shaw Ave	1,300 ft east of N. Hayes Ave to N. Polk Ave	63.3	71.0	7.7	Yes	**Yes**
W. Shaw Ave	N. Polk Ave to SR 99	66.4	73.3	6.9	Yes	**Yes**
W. Gettysburg Ave	1,300 ft west of N. Bryan Ave to Bryan Ave	50.9	58.5	7.6	No	No
W. Gettysburg Ave	N. Bryan Ave to N. Hayes Ave	52.4	60.5	8.1	No	No
W. Gettysburg Ave	N. Hayes Ave to N. Polk Ave	53.0	62.8	9.8	No	No
W. Gettysburg Ave	N. Polk Ave to N. Barcus	53.6	62.3	8.8	No	No
W. Ashlan Ave	N. Garfield to N. Grantland	No Data	64.3	n/a	n/a	n/a
W. Ashlan Ave	N. Grantland Ave to N. Bryan Ave	58.7	70.4	11.7	Yes	**Yes**
W. Ashlan Ave	N. Bryan Ave to N. Hayes Ave	56.4	67.5	11.2	Yes	**Yes**
W. Ashlan Ave	N. Hayes Ave to N. Polk Ave	54.6	68.0	13.4	Yes	**Yes**

Roadway	Segment	CNEL at 100 feet dBA[2]				
		Existing	Existing + Project + Cumulative	Change	Exceeds Compatibility Criteria	Potentially Significant Impact[4]
W. Ashlan Ave	N. Polk Ave to N. Cornelia Ave	59.6	67.8	8.2	Yes	**Yes**
W. Ashlan Ave	N. Cornelia Ave to N. Blythe Ave	63.6	69.2	5.6	Yes	**Yes**
W. Ashlan Ave	N. Blythe Ave to SR 99	65.2	69.7	4.5	Yes	No
W. Dakota Ave	N. Hayes Ave to N. Barcus Ave	53.0	62.2	9.2	No	No
W. Dakota Ave	N. Barcus Ave to N. Polk Ave	55.6	64.7	9.2	No	No
W. Dakota Ave	N. Polk Ave to N. Cornelia Ave	57.2	61.8	4.6	No	No
W. Dakota Ave	N. Cornelia Ave to N. Blythe Ave	56.4	61.6	5.3	No	No
W. Dakota Ave	N. Blythe Ave to N Brawley Ave	55.1	61.3	6.2	No	No
W. Dakota Ave	N Brawley Ave to N. Parkway Drive	53.9	58.8	4.9	No	No
W. Shields Ave	N. Garfield Ave to Grantland Ave	54.4	No Data	n/a	n/a	n/a
W. Shields Ave	N. Grantland Ave to N. Bryan Ave	54.5	61.3	6.9	No	No
W. Shields Ave	N. Bryan Ave to N. Hayes Ave	55.6	62.0	6.4	No	No
W. Shields Ave	N. Hayes Ave to N. Polk Ave	55.2	61.0	5.8	No	No
W. Shields Ave	N. Polk Ave to N. Dante Ave	58.4	66.0	7.6	Yes	**Yes**
W. Shields Ave	N. Dante Ave to N. Cornelia Ave	58.4	66.0	7.6	Yes	**Yes**
W. Shields Ave	N. Cornelia Ave to N. Blythe Ave	56.7	63.0	6.3	No	No
W. Shields Ave	N. Blythe Ave to N. Brawley Ave	56.5	63.3	6.8	No	No
W. Shields Ave	N Brawley Ave to N. Valentine Ave	57.7	63.0	5.3	No	No
W. Shields Ave	N. Valentine Ave to N. Marks Ave	58.5	62.9	4.5	No	No
W. Clinton Ave	N. Grantland Ave to N. Bryan Ave	47.5	55.4	7.9	No	No
W. Clinton Ave	N. Bryan Ave to N. Hayes Ave	49.9	61.6	11.7	No	No

ROADWAY	SEGMENT	CNEL AT 100 FEET DBA[2]				
		EXISTING	EXISTING + PROJECT + CUMULATIVE	CHANGE	EXCEEDS COMPATIBILITY CRITERIA	POTENTIALLY SIGNIFICANT IMPACT[4]
W. Clinton Ave	N. Hayes Ave to N. Polk Ave	51.7	62.0	10.3	No	No
W. Clinton Ave	N. Polk Ave to 1,900 ft east of N. Polk Ave	51.7	62.9	11.2	No	No
W. Clinton Ave	1,900 ft east of N. Polk Ave to N. Cornelia Ave	59.0	66.9	8.0	Yes	**Yes**
W. Clinton Ave	N. Cornelia Ave to N. Milburn Ave	63.0	68.9	5.9	Yes	**Yes**
W. Clinton Ave	N. Milburn Ave to N. Blythe Ave	61.8	68.5	6.6	Yes	**Yes**
W. Clinton Ave	N. Blythe Ave to N Sonora Ave	64.6	68.9	4.2	Yes	No
W. Clinton Ave	N. Sonora Ave to N Brawley Ave	63.5	67.7	4.2	Yes	No
W. Clinton Ave	N Brawley Ave to N. Knoll Ave	63.7	68.5	4.7	Yes	No
W. Clinton Ave	N. Knoll Ave to 850 ft east of N. Knoll Ave	63.6	68.3	4.7	Yes	No
W. Clinton Ave	850 ft east of N. Knoll Ave to N. Valentine Ave	61.4	66.2	4.7	Yes	No
W. Clinton Ave	N. Valentine Ave to N. Marks Ave	64.2	69.7	5.5	Yes	**Yes**
W. Clinton Ave	N. Marks Ave to W. Vassar Ave	68.0	72.6	4.6	Yes	No
N Garfield Ave	W. Herndon Ave to W. Bullard Ave	No Data	57.8	n/a	n/a	n/a
N Garfield Ave	W. Bullard Ave to W. Barstow Ave	No Data	58.4	n/a	n/a	n/a
N Garfield Ave	W. Barstow Ave to 1,000 ft south of W. Barstow Ave	No Data	60.9	n/a	n/a	n/a
N Garfield Ave	1,000 ft south of W. Barstow Ave to W. Shaw Ave	No Data	60.9	n/a	n/a	n/a
N Garfield Ave	W. Shaw Ave to W. Gettysburg Ave	No Data	59.0	n/a	n/a	n/a
N Garfield Ave	W. Gettysburg to W. Ashlan Ave	No Data	58.8	n/a	n/a	n/a
N Garfield Ave	W. Ashlan Ave to W. Dakota Ave	No Data	21.5	n/a	n/a	n/a
N Garfield Ave	W. Dakota Ave to W. Shields Ave	No Data	58.5	n/a	n/a	n/a

Roadway	Segment	CNEL at 100 feet dBA[2]				
		Existing	Existing + Project + Cumulative	Change	Exceeds Compatibility Criteria	Potentially Significant Impact[4]
N. Parkway Drive	N Herndon Ave to W. Herndon Ave	No Data	57.7	n/a	n/a	n/a
N. Grantland Ave	N. Parkway Drive to W. Bullard Ave	No Data	No Data	n/a	n/a	n/a
N. Grantland Ave	W. Bullard Ave to W. Barstow Ave	62.5	64.4	2.0	Yes	No
N. Grantland Ave	W. Barstow Ave to W. Shaw Ave	61.9	65.5	3.6	Yes	No
N. Grantland Ave	W. Shaw Ave to W. Gettysburg Ave	57.4	68.0	10.6	Yes	**Yes**
N. Grantland Ave	W. Gettysburg Ave to W. Ashlan Ave	59.7	71.1	11.5	Yes	**Yes**
N. Grantland Ave	W. Ashlan Ave to W Dakota Ave	58.5	No Data	n/a	n/a	n/a
N. Grantland Ave	W. Dakota Ave to W. Shields Ave	No Data	69.7	n/a	n/a	n/a
N. Grantland Ave	W Shields Ave to W. Clinton Ave	57.3	67.7	10.5	Yes	**Yes**
N. Bryan Ave	W. Shaw Ave to W. Santa Ana Ave	53.9	63.4	9.5	No	No
N. Bryan Ave	W. Santa Ana Ave to W. Gettysburg Ave	53.9	63.4	9.5	No	No
N. Bryan Ave	W. Gettysburg Ave to W. Ashlan Ave	57.6	65.3	7.7	Yes	**Yes**
N. Bryan Ave	W. Ashlan Ave to W. Dakota Ave	55.1	No Data	n/a	n/a	n/a
N. Bryan Ave	W. Dakota Ave to W Shields Ave	52.5	62.9	10.3	No	No
N. Bryan Ave	W Shields Ave to W. Clinton Ave	48.2	61.4	13.2	No	No
N. Hayes Ave	W. Shaw Ave to W. Santa Ana Ave	57.1	66.4	9.3	Yes	**Yes**
N. Hayes Ave	W. Santa Ana Ave to W. Gettysburg Ave	57.0	66.2	9.3	Yes	**Yes**
N. Hayes Ave	W. Gettysburg Ave to W. Swift Ave	55.0	66.8	11.8	Yes	**Yes**
N. Hayes Ave	W. Swift Ave to W. Ashlan Ave	52.4	64.2	11.8	Yes	No
N. Hayes Ave	W. Ashland Ave to W. Dakota Ave	53.9	64.9	11.0	Yes	No
N. Hayes Ave	W. Dakota Ave to 1,300 ft South of W. Dakota Ave	53.4	63.3	9.9	Yes	No

Roadway	Segment	CNEL at 100 feet dBA[2]				
		Existing	Existing + Project + Cumulative	Change	Exceeds Compatibility Criteria	Potentially Significant Impact[4]
N. Hayes Ave	1,300 ft South of W. Dakota Ave to W Shields Ave	56.0	65.9	9.9	Yes	**Yes**
N. Hayes Ave	W Shields Ave to W. Clinton Ave	52.3	62.5	10.3	Yes	No
N. Polk Ave	North of W. Shaw Ave	60.1	61.8	1.7	Yes	No
N. Polk Ave	W. Shaw Ave to W. Acacia Ave	62.3	67.8	5.5	Yes	**Yes**
N. Polk Ave	W. Acacia Ave to W. Gettysburg Ave	62.4	67.9	5.5	Yes	**Yes**
N. Polk Ave	W. Gettysburg Ave to W. Ashlan Ave	58.3	66.5	8.1	Yes	**Yes**
N. Polk Ave	W. Ashland Ave to W. Griffith Way	59.0	66.5	7.5	Yes	**Yes**
N. Polk Ave	W. Griffith Way to W. Dakota Ave	61.1	68.7	7.5	Yes	**Yes**
N. Polk Ave	W. Dakota Ave to W Shields Ave	58.4	65.3	6.9	Yes	**Yes**
N. Polk Ave	W Shields Ave to W. Clinton Ave	57.2	64.9	7.7	No	No
N. Cornelia Ave	N. Parkway Drive to W. Gettysburg Ave	60.2	62.3	2.1	No	No
N. Cornelia Ave	W. Gettysburg to W. Ashlan Ave	60.2	66.1	5.9	Yes	**Yes**
N. Cornelia Ave	W. Ashland Ave to W. Bellaire Way	61.6	64.6	3.0	No	No
N. Cornelia Ave	W. Bellaire Way to W. Dakota Ave	61.6	64.6	3.0	No	No
N. Cornelia Ave	W. Dakota Ave to W Shields Ave	57.7	62.6	4.9	No	No
N. Cornelia Ave	W Shields Ave to W. Clinton Ave	60.1	64.4	4.3	No	No
N. Blythe Ave	W. Ashlan Ave to W. Dakota Ave	59.7	63.8	4.1	No	No
N. Blythe Ave	W. Dakota Ave to W Shields Ave	56.8	62.5	5.6	No	No
N. Blythe Ave	W Shields Ave to W. Clinton Ave	57.0	62.2	5.2	No	No
N Brawley Ave	N. Parkway Drive to W. Dakota Ave	58.3	63.3	5.0	No	No
N Brawley Ave	W. Dakota Ave to W. Dayton Ave	58.0	62.2	4.1	No	No

Roadway	Segment	CNEL at 100 feet dBA[2]				
		Existing	Existing + Project + Cumulative	Change	Exceeds Compatibility Criteria	Potentially Significant Impact[4]
N Brawley Ave	W. Dayton Ave to W. Cortland Ave	60.6	64.7	4.1	No	No
N Brawley Ave	W. Cortland Ave to W. Shields Ave	57.9	62.0	4.1	No	No
N Brawley Ave	W Shields Ave to W. Clinton Ave	57.6	62.1	4.5	No	No
N. Valentine Ave	N. Parkway Drive to W Shields Ave	53.9	60.7	6.8	No	No
N. Valentine Ave	W Shields Ave to W. Clinton Ave	52.9	60.4	7.5	No	No
N. Marks Ave	W Princeton Ave to W. Clinton Ave	59.2	61.5	2.3	No	No

Note:
[1] Exterior noise levels calculated at 5 feet above ground level.
[2] Noise levels calculated from centerline of subject roadway.
[3] See Table 3.11-4.
[4] Significant if results in a 3 dB increase in ambient noise levels and exceeds standard in Table 3.11-4.
Source: MD Acoustics, September 2020.

As shown in Table 3.11-10, existing plus project plus cumulative traffic conditions will result in significant increases in ambient noise levels along the following road segments:

- Traffic noise levels along **W. Shaw Avenue** are expected to range between 68.1 and 73.3 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases ranging between 6.9 and 8.3 dBA CNEL.
- Traffic noise levels along **W. Ashlan Avenue between N. Grantland Avenue and N. Blythe Avenue** are expected to range between 67.5 and 70.4 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases ranging between 5.6 and 13.4 dBA CNEL.
- Traffic noise levels along **W. Shields Avenue between N. Polk Avenue and N. Cornelia Avenue** are expected to reach up to 66 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in an increase in ambient noise level of 7.6 dBA CNEL.
- Traffic noise levels along **W. Clinton Avenue between N. Polk Avenue and N. Blythe Avenue** and **between N. Valentine Avenue and N. Marks Avenue** are expected to range between 66.9 and 69.7 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases in ambient noise levels ranging between 5.5 and 8.0 dBA CNEL
- Traffic noise levels along **N. Grantland Avenue between W. Gettysburg Avenue and W. Dakota Avenue** and **between W. Shields Avenue and W. Clinton Avenue** are expected to range between 67.7 and 71.0 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases in ambient noise levels between 10.5 and 11.5 dBA CNEL.

- Traffic noise levels along **N. Bryan Avenue between W. Gettysburg Avenue and W. Ashlan Avenue** are expected to reach up to 65.3 dBA CNEL, resulting in an increase of 7.7 dBA CNEL in ambient noise levels.
- Traffic noise levels along **N. Hayes Avenue between W. Shaw Avenue and W. Swift Avenue** and **between W. Dakota Avenue and W. Shields Avenue** are expected to range between 65.9 and 66.8 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases in ambient noise levels ranging between 9.3 and 11.8 dBA CNEL.
- Traffic noise levels along **N. Polk Avenue between W. Shaw Avenue and W. Shields Avenue** are expected to range between 65.3 and 68.7 dBA CNEL at a distance of 100 feet from the centerline of the road, resulting in increases in ambient noise levels between 5.5 and 8.1 dBA CNEL.
- Traffic noise levels along **N. Cornelia Avenue between W. Gettysburg Avenue and W. Ashlan Avenue** are expected to reach up to 66.1 dBA CNEL, resulting in an increase of 5.9 dBA CNEL in ambient noise levels.

Based upon Policy NS-1j of the City's General Plan, which is used as a threshold of significance for the City's environmental review process, a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dB L_{dn} or CNEL above the ambient noise limits established in the General Plan Update (or in this case, the modeled increase in traffic noise levels due to the project). Future traffic noise is anticipated to result in a substantial increase in ambient noise levels on existing sensitive receptors, ranging in increases between 5.5 dBA to 13.4 dBA at the roadway segments listed above. Therefore, this is a potentially significant impact.

RAIL NOISE IMPACTS

Noise associated with the existing UPRR line is expected to remain the same or end altogether. The California High-Speed Train Project, which is currently under construction east of SR 99 will introduce more noise into the eastern portion of the Plan Area. According to the Noise and Vibration Technical Report prepared for the Merced to Fresno Section of the High Speed Train (CAHST, FRA 2012), trains in the Fresno area are expected to result in noise levels between 65 to 76 dB L_{dn} at nearby receptors. All of the receptors which would be moderately or severely impacted by the High-Speed Train are located outside of the Plan Area to the east. High-Speed Train noise is not expected to result in significant noise impacts within the Plan Area. As such, this impact would be less than significant.

AGRICULTURAL NOISE IMPACTS

The Plan Area is currently exposed to agricultural noise including field and crop maintenance, hauling, and crop dusting from small aircraft. The noise from these sources mostly occurs within the confines of the agricultural fields, and is seasonal. A characteristic of agricultural noise is short periods of noisy activities separated by long periods of little or no noise-producing activities. The FAA regulates noise associated with aircraft once they leave the ground. FAA regulations require

that all aircraft maintain a height of at least 500 feet above ground or objects on the ground, like a house. A crop duster can go below this height only to operate to apply chemicals and for no other reason.

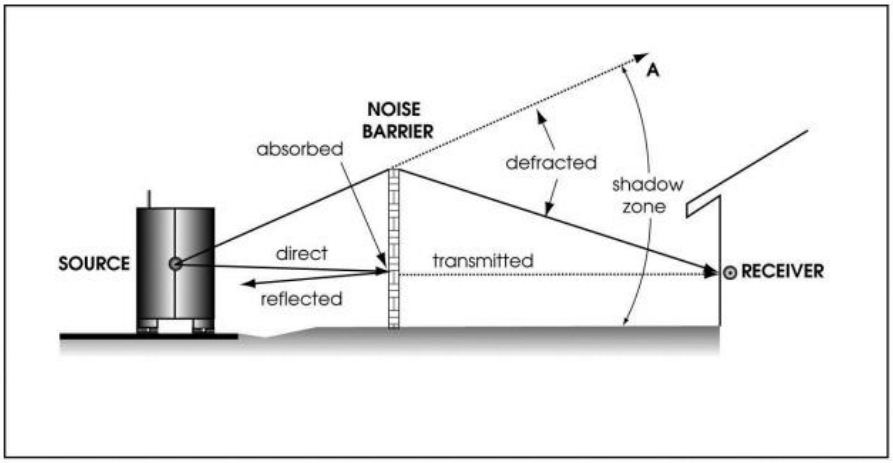
Future development of the Plan Area may result in the exposure of sensitive receptors to agricultural noise. However, noise associated with crop cultivation is specifically exempt from compliance with the noise regulations presented in Section 15-2506 of the City of Fresno Municipal Code. As such, this impact would be less than significant.

CONCLUSION

As described above, buildout of the Plan Area would result in substantial increases in ambient traffic noise levels resulting in potentially significant impacts to existing and proposed receptors. With respect to future sensitive receptors, noise levels in the Plan Area are expected to exceed 65 dBA CNEL in most areas where shielding from traffic noise is not provided. Additionally, future traffic noise is anticipated to result in a substantial increase in ambient noise levels on existing sensitive receptors. Of the 115 roadway segments analyzed in Table 3.11-10, 30 segments would experience substantial noise increases greater than 3 dBA attributable to buildout of the proposed Specific Plan, with noise levels that exceed 65 dB CNEL.

For these reasons, future development projects within the Plan Area would be required to implement mitigation measures that are specifically intended to ensure compliance with the City of Fresno noise standards and minimize the impact associated with the substantial increase in ambient noise levels. Mitigation Measure 3.11-1 would require the implementation of performance standards based on project-specific acoustical analysis for new residential and noise sensitive uses exposed to significant exterior community noise levels from transportation, which may include noise walls and/or berms, or setbacks.

Walls/Berms: As shown in the diagram below, when a noise barrier is inserted between a noise source and receiver, the direct noise path along the line of sight between the two is interrupted. Some of the acoustical energy will be transmitted through the barrier material and continue to the source, although at a reduced level. The amount of this reduction depends on the material's mass and rigidity, and is called the transmission loss (TL), which is expressed in decibels. To be effective, noise barriers need to be solid, without holes and cracks. Concrete walls and earthen berms tend to provide the most noise attenuation, but other materials can be used. The exact amount of reduction provided by a barrier will range depending on the material, location and height of the barrier but barriers can be used to mitigate significant noise impacts to sensitive receptors in outdoor activity areas. Because the Plan Area is flat, noise walls and/or berms would be highly effective.



SOURCE: CALTRANS 2013A

Setbacks: Traffic noise is not a single, stationary point source. The movement of vehicles makes the noise source of the sound appear to be emanate from a line rather than from a point when viewed over a time interval. Noise levels associated with vehicle traffic are reduced by 3 dB for every doubling of distance from the receiver. For this reason, increasing the distance between the noise source and the receiver can be used to avoid significant impacts related to traffic noise at sensitive receptors within the Plan Area.

Mitigation Measure 3.11-1 would reduce traffic noise levels to a less-than-significant level. Therefore, with implementation of mitigation, buildout of the proposed Specific Plan would result in ***less than significant*** impacts relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-1: *Future project proponent(s) for development projects in the Plan Area which involve residential or other noise sensitive uses shall implement performance standards for noise reduction for new residential and noise sensitive uses exposed to exterior community noise levels from transportation sources above 65 dB L_{dn} or CNEL, as shown on Exhibit G: Existing Plus Project Plus Cumulative Noise Contours of the West Area Specific Plan Noise Impact Study prepared by MD Acoustics (dated September 30, 2020), or as identified by a project-specific acoustical analysis based on the target acceptable noise levels set in Table 9-2 of the Fresno General Plan Noise Element (Table 3.11-5 of this EIR).*

If future exterior noise levels are expected to exceed the applicable standards presented in Table 9-2 of the Fresno General Plan Noise Element (Table 3.11-5 of this EIR), the mitigation measure presented below shall be implemented, as applicable. A qualified Acoustical Consultant shall provide information demonstrating that site specific mitigation will be effective at reaching the applicable noise standard.

- *Install noise walls, berms and/or a combination of a landscaped berm with wall, and reduced barrier height in combination with increased distance or elevation differences*

between noise source and noise receptor. The City of Fresno has established a maximum allowable height for noise walls of 15 feet. As such, the noise walls, berms and/or a combination of a landscaped berm with wall shall not exceed 15 feet.

The aforementioned measure is not exhaustive and alternative designs may be approved by the City, provided that a qualified Acoustical Consultant submits information demonstrating that the alternative design(s) will achieve and maintain the specific targets for outdoor activity areas and interior spaces.

Impact 3.11-2: Specific Plan implementation would not substantially increase noise levels associated with construction and demolition activities. (Less than Significant with Mitigation)

The Environmental Protection Agency (EPA) has compiled data regarding the noise generated characteristics of typical construction activities. The data is presented in Table 3.11-11. These noise levels would diminish rapidly with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 86 dBA measured 50 feet from the noise source would reduce to 80 dBA at 100 feet. At 200 feet from the noise source, the noise level would reduce to 74 dBA. At 400 feet from the noise source, the noise level would reduce by another 6 dBA to 68 dBA. Contractors are required to comply with the City of Fresno's Noise Ordinance during construction, as described in Section 10-109.

TABLE 3.11-11: TYPICAL CONSTRUCTION NOISE LEVELS

TYPE[1]	*NOISE LEVELS (DBA) AT 50 FEET*
EQUIPMENT POWERED BY INTERNAL COMBUSTION ENGINES	
EARTH MOVING	
Compactors (rollers)	73 – 76
Front Loaders	73 – 84
Backhoes	73 – 92
Tractors	75 – 95
Scrapers, Graders	78 – 92
Pavers	85 – 87
Trucks	81 – 94
MATERIALS HANDLING	
Concrete Mixers	72 – 87
Concrete Pumps	81 – 83
Cranes (Moveable)	72 – 86
Cranes (Derrick)	85 – 87
STATIONARY	
Pumps	68 – 71
Generators	71 – 83
Compressors	75 – 86
IMPACT EQUIPMENT	
Saws	71 – 82
Vibrators	68 – 82

SOURCE: REFERENCE NOISE LEVELS FROM THE ENVIRONMENTAL PROTECTION AGENCY

CONSTRUCTION TRAFFIC

Future development projects in the Plan Area would result in short-term noise impacts associated with construction activities. Two types of short-term noise impacts could occur during construction of the proposed project. First, construction crew commute and the transport of construction equipment and materials to the site for the proposed project would incrementally increase noise levels on access roads leading to the site. Truck traffic associated with project construction should be limited to within the permitted construction hours, as listed in the City's Municipal Code. Although there would be a relatively high single-event noise exposure potential at a maximum of 87 dBA L_{max} at 50 feet from passing trucks, causing possible short-term intermittent annoyances, the effect on ambient noise levels would be less than 1 dBA when averaged over one hour or 24 hours. In other words, the changes in noise levels over 1 hour or 24 hours attributable to passing trucks would not be perceptible to the normal human ear. Therefore, short-term construction-related impacts associated with worker commute and equipment transport on local streets leading to the project site would result in a ***less than significant*** impact on noise-sensitive receptors along the access routes.

CONSTRUCTION ACTIVITIES

The site preparation phase, which includes grading and paving, tends to generate the highest noise levels, since the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery such as backhoes, bulldozers, and front loaders. Earthmoving and compacting equipment includes compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Future development projects in the Plan Area are expected to require the use of scrapers, bulldozers, motor grader, and water and pickup trucks. Noise associated with the use of construction equipment is estimated to reach between 79 and 89 dBA L_{max} at a distance of 50 feet from the active construction area for the grading phase. The maximum noise level generated by each scraper is assumed to be approximately 87 dBA L_{max} at 50 feet from the scraper in operation. Each bulldozer would also generate approximately 85 dBA L_{max} at 50 feet. The maximum noise level generated by the sound sources with equal strength increases the noise level by 3 dBA. The worst-case combined noise level during this phase of construction would be 91 dBA L_{max} at a distance of 50 feet from an active construction area. Noise reduction potential will be project and site specific.

Typical operating cycles for these types of construction equipment may involve one or two minutes of full power operation followed by three to four minutes at lower power settings. Noise levels will be loudest during grading phase. A likely worst-case construction noise scenario during grading assumes the use of a grader, a dozer, and two (2) excavators, two (2) backhoes and a scrapper operating at 50 feet from the nearest sensitive receptor.

Assuming a usage factor of 40 percent for each piece of equipment, unmitigated noise levels at 50 feet have the potential to reach 90 dBA L_{eq} and 92 dBA L_{max} at the nearest sensitive receptors during

grading. Noise levels for the other construction phases would be lower and range between 85 to 90 dBA. For this reason, the *West Area Specific Plan Noise Impact Study* identifies a number of measures to minimize construction noise impacts associated with the buildout of the Specific Plan, which have been incorporated as mitigation measures. Implementation of the following mitigation measures would ensure that the nearby sensitive receptors to the Plan Area would not be subject to construction noise levels in excess of the City's standards, resulting in a ***less than significant*** impact.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-2: *Construction within the Plan Area must follow the City's Municipal Noise Code Section 10-109 which exempts construction, repair or remodeling work accomplished pursuant to a building, electrical, plumbing, mechanical, or other construction permit issued by the City or other governmental agency, or to site preparation and grading, provided such work takes place between the hours of 7:00 a.m. and 10:00 p.m. on any day except Sunday.*

Mitigation Measure 3.11-3: *The project proponent(s) and/or construction contractor(s) shall demonstrate, to the satisfaction of the City of Fresno Planning and Development Department, that buildout of the Specific Plan complies with the following:*

- *Truck traffic associated with project construction shall be limited to within the permitted construction hours, as listed in the City's Municipal Code above.*
- *Stationary construction noise sources such as generators or pumps shall be located at least 300 feet from sensitive land uses, as feasible.*
- *Construction staging areas shall be located as far from noise sensitive land uses as feasible.*
- *During construction, the contractor shall ensure all construction equipment is equipped with appropriate noise attenuating devices. The use of manufacturer certified mufflers would generally reduce the construction equipment noise by 8 to 10 dBA.*
- *Idling equipment shall be turned off when not in use.*
- *Equipment shall be maintained so that vehicles and their loads are secured from rattling and banging.*

Impact 3.11-3: Specific Plan implementation would not substantially increase noise vibration association with construction activities. (Less than Significant with Mitigation)

The effects of vibration on structures have been the subject of extensive research. The Federal Transit Administration has compiled data regarding the vibration levels for various construction equipment and activities and is detailed in Table 3.11-12.

The Transportation and Construction Induced Vibration Guidance Manual for the California Department of Transportation has various recommended vibration thresholds for various types of projects and land uses. According to the Konan Vibration Criteria for Historic and Sensitive Buildings, the criteria for transient vibration sources should not exceed 0.3 peak particle velocity (PPV) (Section 6 – Structures, Table 11). In addition, 0.035 inches per second PPV is barely perceptive.

TABLE 3.11-12: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	*PEAK PARTICLE VELOCITY @ 25 FEET (INCHES/SECOND)*	*APPROXIMATE VIBRATION LEVEL LV (VDB) @ 25 FEET*
Pile Drive (impact)	1.518 (upper range)	112
	0.644 (typical)	104
Pile driver (sonic)	0.734 (upper range)	105
	0.170 (typical)	93
Clam shovel drop (slurry wall)	0.202	94
Vibratory Roller	0.21	94
Hoe Ram	0.089	87
Large Bulldozer	0.089	87
Caisson Drill	0.089	87
Loaded Trucks	0.076	86
Jackhammer	0.035	79
Small Bulldozer	0.003	58

SOURCE: FEDERAL TRANSIT ADMINISTRATION, TRANSIT NOISE AND VIBRATION IMPACT ASSESSMENT GUIDELINES, MAY 2006

Construction activities can produce vibration that may be felt by adjacent land uses. Typical development projects in the Plan Area would not likely require the use of equipment such as pile drivers, which are known to generate substantial construction vibration levels. For example, the primary vibration source during most future construction may be from a bulldozer. A large bulldozer has a vibration impact of 0.089 inches per second PPV at 25 feet, which is perceptible but below any risk to architectural damage. As shown in Table 3.11-9, a PPV of 0.20 is the threshold at which there is a risk to "architectural" damage to normal dwellings. It also the level at which ground-borne vibration are annoying to people in buildings. Impacts would be significant if construction activities result in ground-borne vibration of 0.20 inches per second PPV or higher at sensitive receptors.

For buildout of the proposed Specific Plan, the distance of the construction equipment would likely be at least 10 feet or more from any existing structure. At a distance of 10 feet, a large bulldozer would yield a worst-case 0.244 inches per second PPV which may be perceptible for short periods of time during site preparation of the southeastern corner of the project site, but no damage is expected. In addition, implementation of Mitigation Measure 3.11-4 would further reduce construction related groundborne vibration. Therefore, this impact is ***less than significant***.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-4: *For future projects which would require the use of highly vibratory equipment in the Plan Area, an additional site- and project-specific analysis shall be conducted by a noise and vibration specialist prior to project approval. The analysis shall evaluate potential ground-borne vibration impacts to existing structures and sensitive receptors, and shall also recommend additional mitigation measures, as necessary. The recommendations of the site- and project-specific analysis shall be implemented by the project proponent(s), to the satisfaction of the City of Fresno Planning and Development Department.*

Impact 3.11-4: Specific Plan implementation would not substantially increase stationary noise at sensitive receptors. (Less than Significant with Mitigation)

The Specific Plan proposes the relocation of higher density land uses away from the most western and southwestern portions of the Plan Area where they are distant from public transit and community amenities and transfers those higher density land use designations to major corridors. The Specific Plan would result in an increase in land designated for employment, mixed use, open space and public facilities uses and a decrease in land designated for residential and commercial uses. Typical stationary noise sources and associated noise levels as measured ten-feet from the source are presented in Table 3.11-13.

TABLE 3.11-13: TYPICAL STATIONARY NOISE LEVELS

TYPE	*NOISE LEVELS (DBA) AT 10 FEET*[1]
Parking Lot Noise	50 – 75
HVAC	55 – 100
Property Maintenance	75 – 95
Trash Truck	85 – 90
Loading/Unloading	65 – 82
Recreational Noise	50 – 90
Amplified Music	85 – 105
Car Wash	85 – 105
Event Venue	65 – 75
Idling Heavy Traffic	72

NOTE: [1.] THE NOISE RANGES PRESENTED ARE INTENDED TO GIVE A GENERAL IDEA OF TYPICAL URBAN/SUBURBAN STATIONARY NOISE SOURCES. DEPENDING ON THE NUMBER OF PATRONS AND THE SPECIFIC ACTIVITY, I.E. OUTDOOR WINERY CONCERT VS. A ROCK BAND, NOISE LEVELS WILL VARY.
SOURCE: MD ACOUSTICS, 2020.

Due to the suburban/rural nature of the Plan Area, future development of the Plan Area will result in a substantial increase in existing ambient noise conditions. Increases in ambient noise levels associated with existing and future stationary noise impacts may result in potentially significant impacts. However, enforcement of the Sections 10-105 through 10-109 of the City's Noise Ordinance and analysis of noise producing projects, along with implementation of Mitigation Measure 3.11-5, would ensure that the nearby sensitive receptors to the Plan Area would not be subject to stationary noise levels in excess of the City's standards. Therefore, this is a ***less than significant*** impact.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-5: *In order to reduce the potential for stationary noise impacts, development projects in the Plan Area shall implement the following measures:*

- *Avoid the placement of new noise producing uses in proximity to noise-sensitive land uses;*

- *Apply noise level performance standards provided in Table 9-2 of the City of Fresno General Plan Noise Element (Table 3.11-5 of this EIR) to proposed new noise producing uses; and*
- *Require new noise-sensitive uses in near proximity to noise-producing facilities include mitigation measures that would ensure compliance with noise performance standards in Table 9-2 of the City of Fresno General Plan Noise Element (Table 3.11-5 of this EIR).*

Impact 3.11-5: Specific Plan implementation would not substantially increase ambient interior noise at future sensitive receptors. (Less than Significant with Mitigation)

Based on the data provided in the EPA's Protective Noise Levels (EPA 550/9-79-100, Nov 1979), standard homes in California provide at least 12 dBA of noise exterior to interior noise attenuation with windows open and 20 dBA with windows closed. Therefore, residences would need to be exposed to exterior noise levels exceeding 65 dBA CNEL (45 dBA + 20 dBA = 65 dBA) to potentially exceed the interior noise standard of 45 dBA CNEL with windows closed. A windows closed condition is defined as: the interior noise level with the windows closed. Upgrades are required for residential structures that would experience interior noise levels exceeding the 45 dBA CNEL noise standard when windows are closed (e.g. higher grade of insulation in outdoor walls, and/or double-paned windows and air condition units).

As discussed in Impact 3.11-1, the existing and future traffic noise levels anticipated from implementation of proposed Specific Plan would result in exterior noise levels exceeding 65 dBA, which could result in the interior noise levels at future land uses exceeding the City's interior noise level standards of 45dBA, as presented in 3.11-5. To reduce the interior noise impacts, site-specific noise analyses will be required for future development projects under the proposed Specific Plan, as required by Mitigation Measure 3.11-6. The site-specific noise analyses will be required to fine-tune and finalize noise reduction features and must demonstrate the interior noise level will not exceed the City's 45 dBA CNEL noise limit. Potential noise reduction features may include a "windows closed" condition and possibly upgraded windows with increased STC ratings for doors and windows.

Implementation of Mitigation Measure 3.11-6 would ensure that the future land uses within the Specific Plan would not be subject to interior noise levels in excess of the City's standards. Therefore, this is a ***less than significant*** impact relative to this topic.

MITIGATION MEASURE(S)

Mitigation Measure 3.11-6: *Prior to approval, site- and project-specific noise analyses development projects under the proposed Specific Plan shall be completed and submitted to the City in order to fine-tune and finalize noise reduction features. The site-specific noise analyses must demonstrate the interior noise level will not exceed the City's 45 dBA CNEL noise limit.*

A qualified Acoustical Consultant shall provide information demonstrating that site specific mitigation will be effective at reaching the applicable noise standard, which includes:

- *Install noise walls, berms and/or a combination of a landscaped berm with wall, and reduced barrier height in combination with increased distance or elevation differences between noise source and noise receptor. The City of Fresno has established a maximum allowable height for noise walls of 15 feet. As such, the noise walls, berms and/or a combination of a landscaped berm with wall shall not exceed 15 feet.*
- *Utilize façades with substantial weight and insulation.*
- *Install sound-rated windows for primary sleeping and activity areas.*
- *Install sound-rated doors for all exterior entries at primary sleeping and activity areas.*
- *Install acoustic baffling of vents for chimneys, attic and gable ends.*
- *Install mechanical ventilation systems that provide fresh air under closed window conditions.*

The aforementioned measures are not exhaustive and alternative designs may be approved by the City, provided that a qualified Acoustical Consultant submits information demonstrating that the alternative design(s) will achieve and maintain the specific targets for outdoor activity areas and interior spaces.

Impact 3.11-6: Specific Plan implementation would not expose people residing or working in the project area to excessive airport or aircraft noise. (Less than Significant)

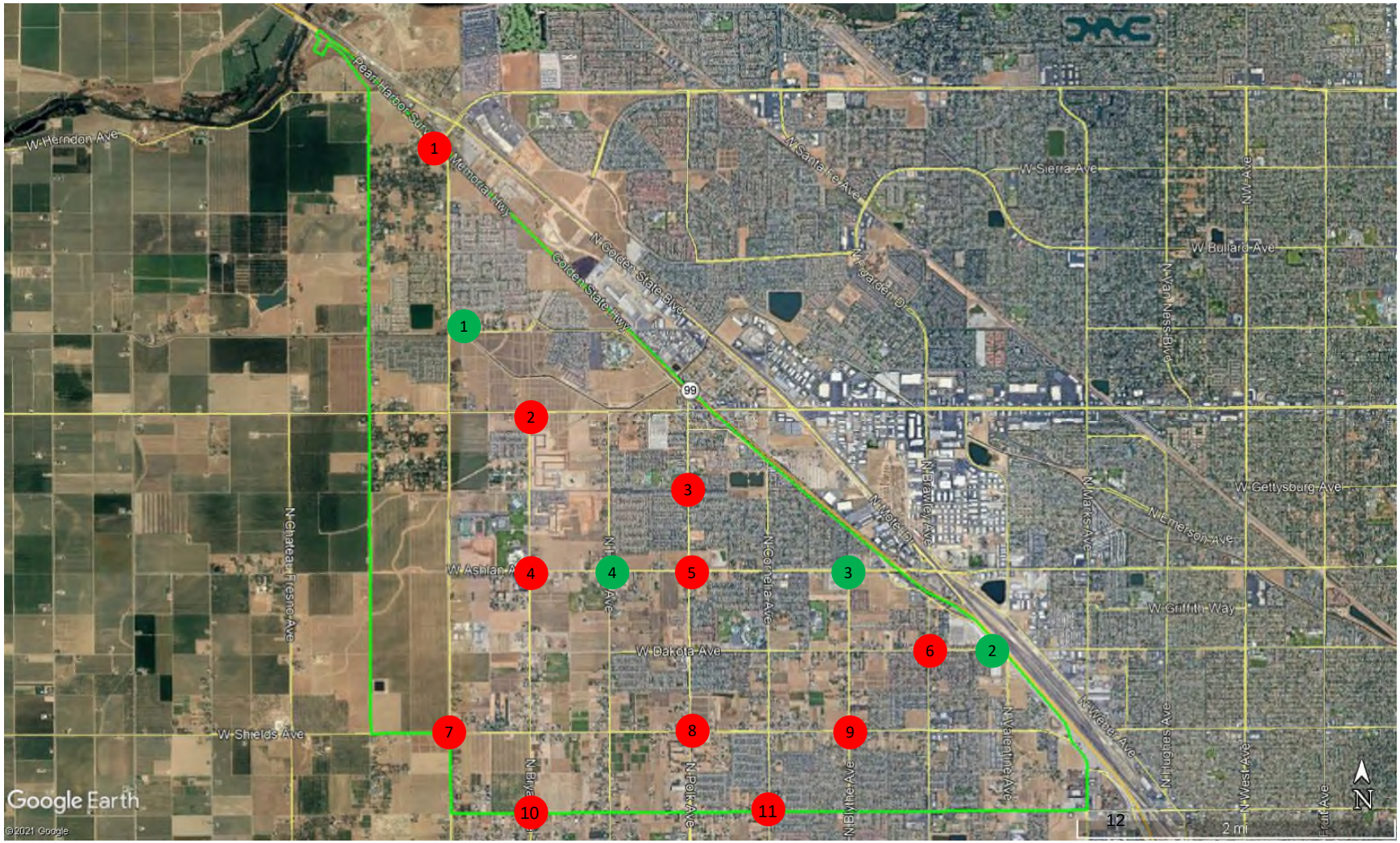
There are no airports located within the Plan Area and noise contours associated with airports in the vicinity of the Plan Area are not expected to encroach into the Plan Area (City of Fresno 2014). The closest public or public use airport is the Fresno Chandler Executive Airport, located approximately 2.5 miles to the south of the Plan Area, at its closest point. The Plan Area will however, continue to be affected by fly-over noise associated with the Fresno Yosemite International Airport, the Fresno-Chandler Downtown airport, and the Sierra Sky Park Airport. However, airport noise and aircraft noise are not expected to result in significant impacts in the Plan Area. Therefore, this is a ***less than significant*** impact relative to this topic.

= West Area Specific Plan Boundary

1 = Long Term measurement (24-Hour)

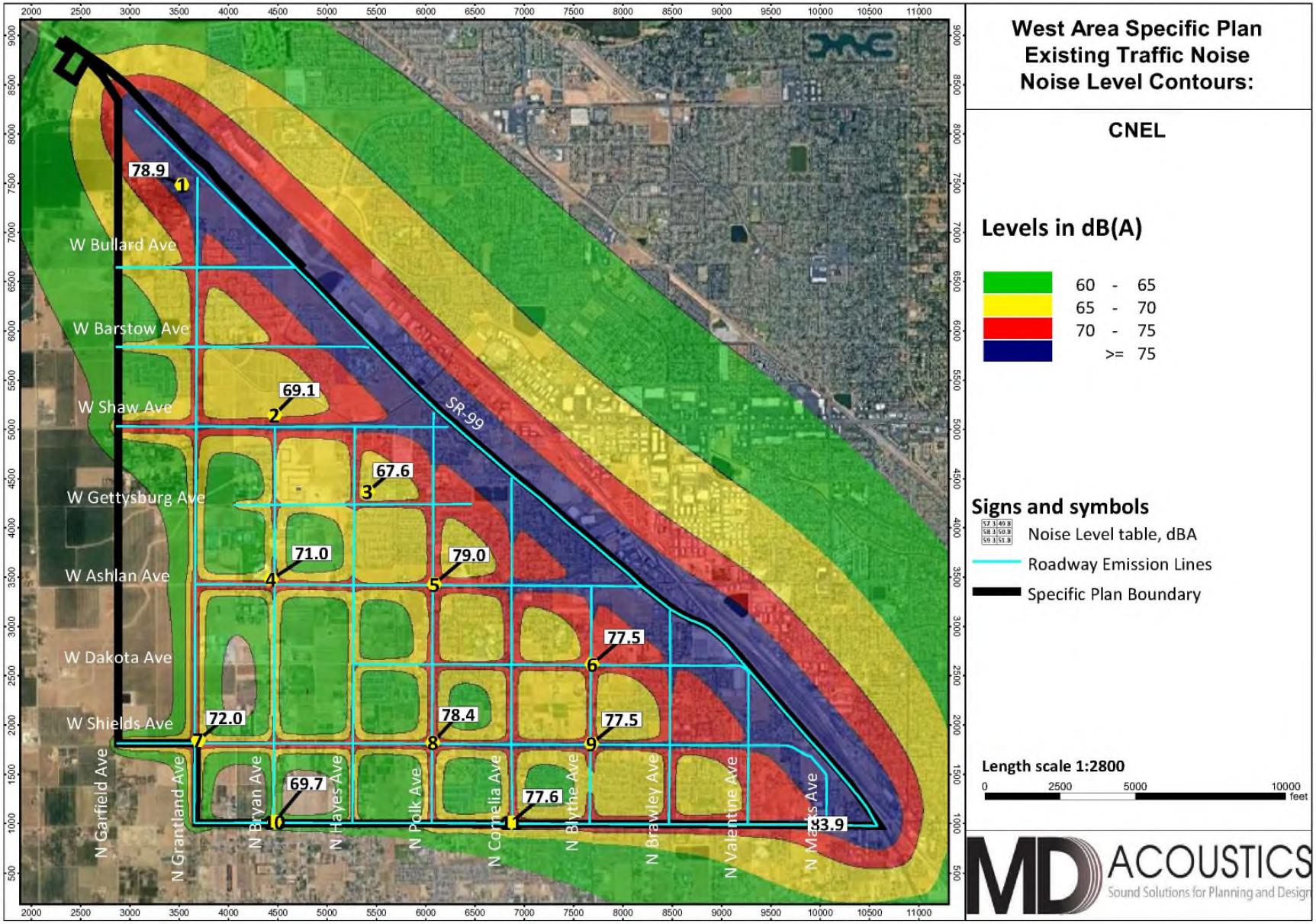
1 = Short Term measurement (10-Minute)

Figure 3.11-1
Noise Measurement Location Map



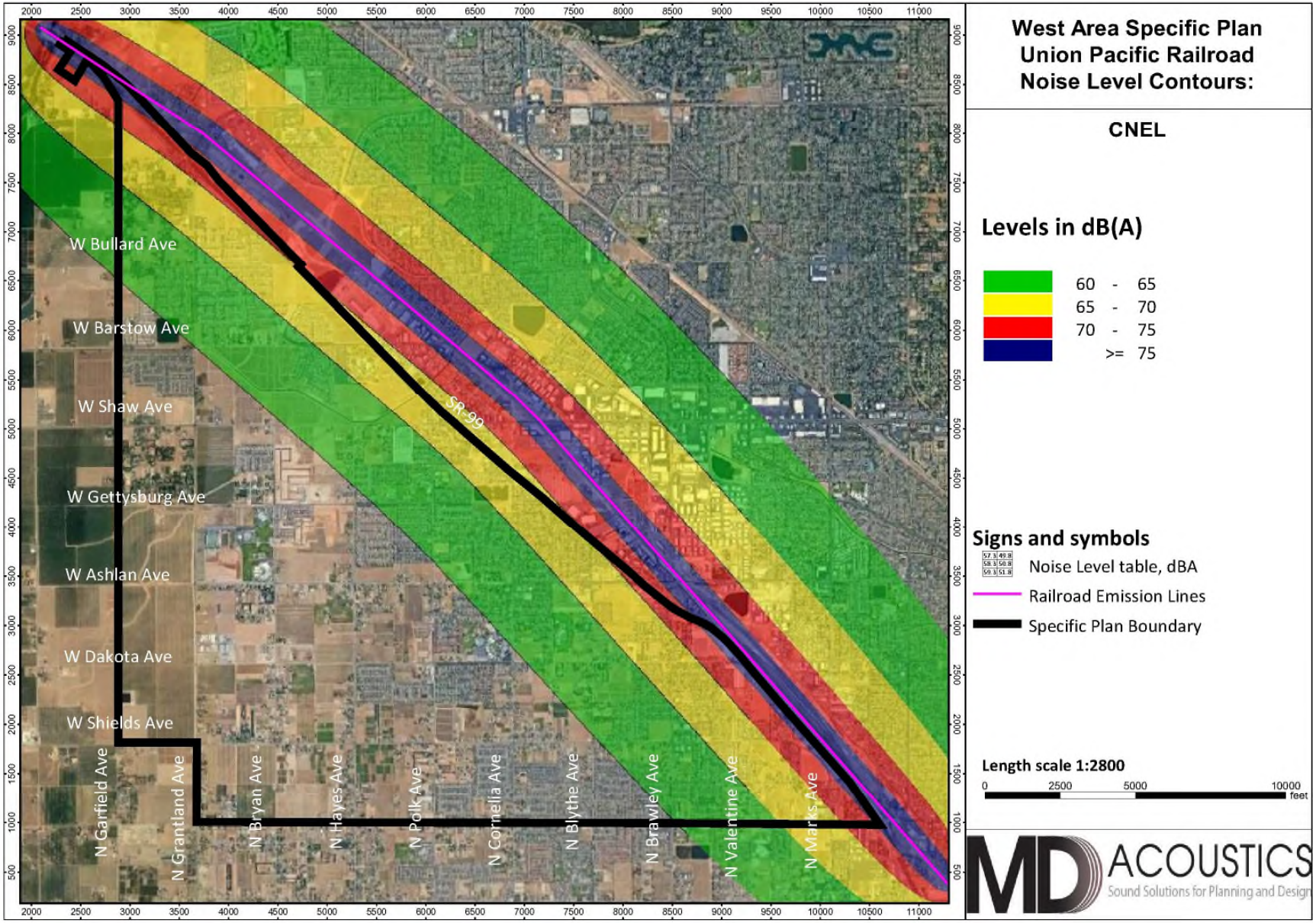
This page left intentionally blank.

Figure 3.11-2
Existing Roadway Noise Level Contours (CNEL)



This page left intentionally blank.

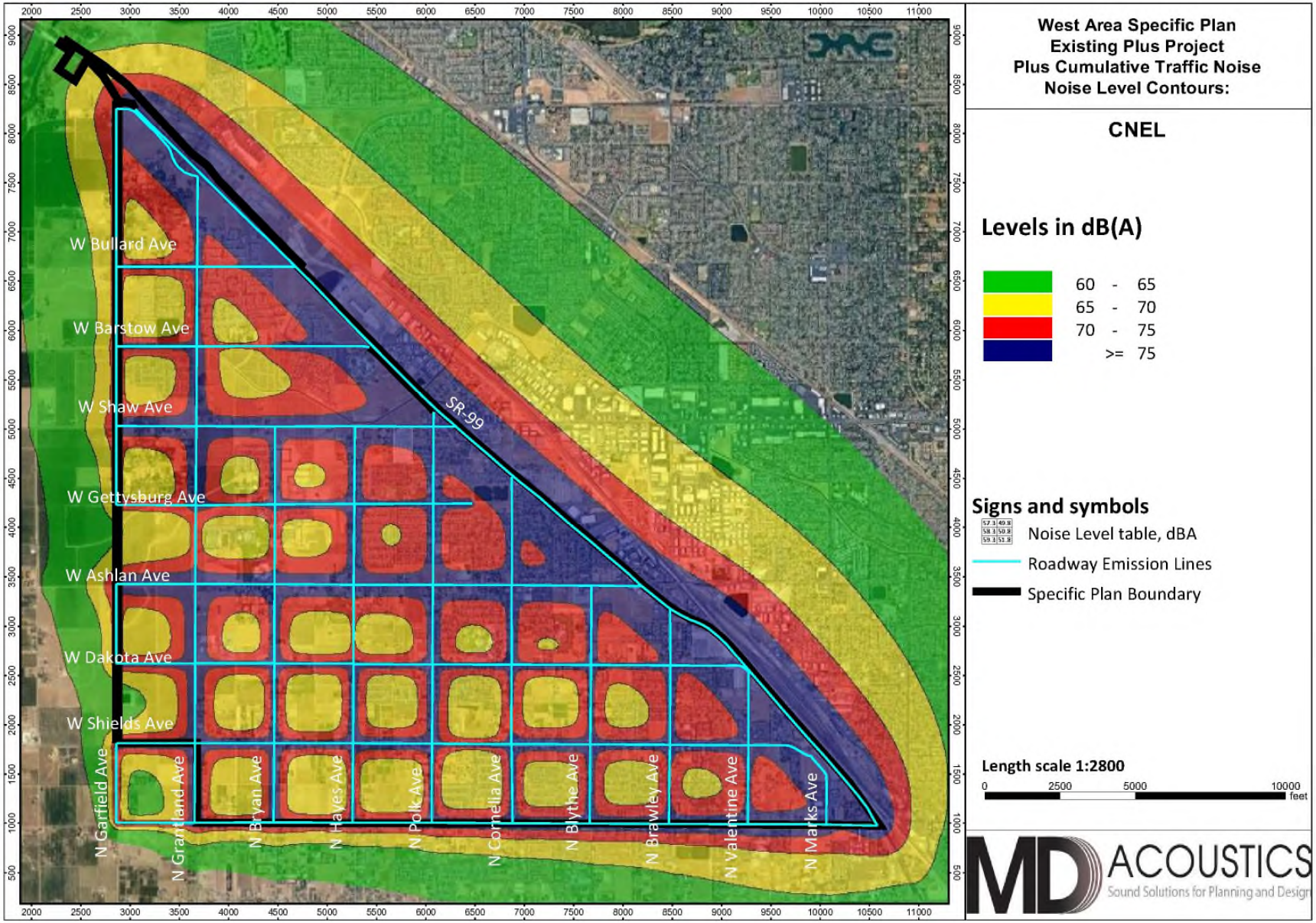
Figure 3.11-3
Union Pacific Railroad Noise Level Contours (CNEL)



This page left intentionally blank.

Figure 3.11-4

Existing Plus Project Plus Cumulative Roadway Noise Level Contours (CNEL)



This page left intentionally blank.