Appendix E

Environmental Noise Assessment

West Davis Active Adult Community

City of Davis, California

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jcb Project # 2017-112

Prepared for:

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This section provides a general description of the existing noise sources in the project vicinity, a discussion of the regulatory setting, and identifies potential noise impacts associated with the proposed project. Project 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.

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 (10 p.m. to 7 a.m.) 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 (Hertz.)
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	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 L50 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 (Leq), 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 Leq is the foundation of the composite noise descriptor, Ldn, and shows very good correlation with community response to noise.

The day/night average level (Ldn) 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 Ldn represents a 24-hour average, it tends to disguise short-term variations in the noise environment. CNEL is similar to Ldn, 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 change of 1 dBA 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

To quantify the existing ambient noise environment in the project vicinity, j.c. brennan & associates utilized noise level measurements previously conducted for the former West Davis Innovation Center (DIC) project on the same project site in January 2015. Short-term ambient noise level measurements and continuous (24-hour) noise level measurements were conducted at seven locations on the project site when schools, including UC Davis, were in session. The noise measurement locations are shown in Figure 3.11-1. Figure 3.11-2 shows the project site plan. The noise level measurement survey results are provided in Table 3.11-2. Appendix A shows the complete results of the noise monitoring survey.

TABLE 3.11-2: MEASURED AMBIENT NOISE LEVELS

SITE	DATE	AVERAGE MEASURED HOURLY NOISE LEVELS, DBA						
			DAYTIME			NIGHTTIME (10:00 PM – 7:00 AM)		
		LDN	L_{EQ}	L50	L_{MAX}	L_{EQ}	L50	L_{MAX}
Continuous 24-hour Noise Measurement Site								
A	January 7-8, 2015	65	63	61	78	57	49	75
B	January 7-8, 2015	68	64	62	76	61	57	73
Short-term Noise Measurement Sites						Notes:		
1	January 8, 2015 – 10:21 a.m.	N/A	50	49	53	SR-113 and CR 99 traffic noise.		
2	January 8, 2015 – 10:37 a.m	N/A	49	49	53	SR-113 and CR 99 traffic noise.		
3	January 8, 2015 – 10:55 a.m	N/A	50	49	56	SR-113 is primary noise source.		
4	January 8, 2015 – 11:33 a.m	N/A	48	47	57	SR-113 is primary noise source. Some parking lot noise audible.		
5	January 8, 2015 – 12:00 p.m	N/A	60	59	68	SR-113 is primary noise source.		

SOURCE: J.C. BRENNAN & ASSOCIATES, INC. – 2017

j.c. brennan & associates, Inc. conducted continuous hourly ambient noise level measurements for a period of 24-hours on the DIC project site from January 7th to January 8th, 2015. The noise level measurements were conducted to determine typical background average (L_{eq}), median (L_{50}) and maximum (L_{max}) noise levels, and to determine the effective day/night distribution of roadway traffic for inclusion in the traffic noise prediction methodology. Instrumentation consisted of a Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meter, which was calibrated in the field before and after use with an LDL Model CAL200 acoustical calibrator.

West Davis Active Adult Community

Figure : 3.11-1

Project Location and Noise Measurement Locations

j.c. brennan & associates
consultants in acoustics

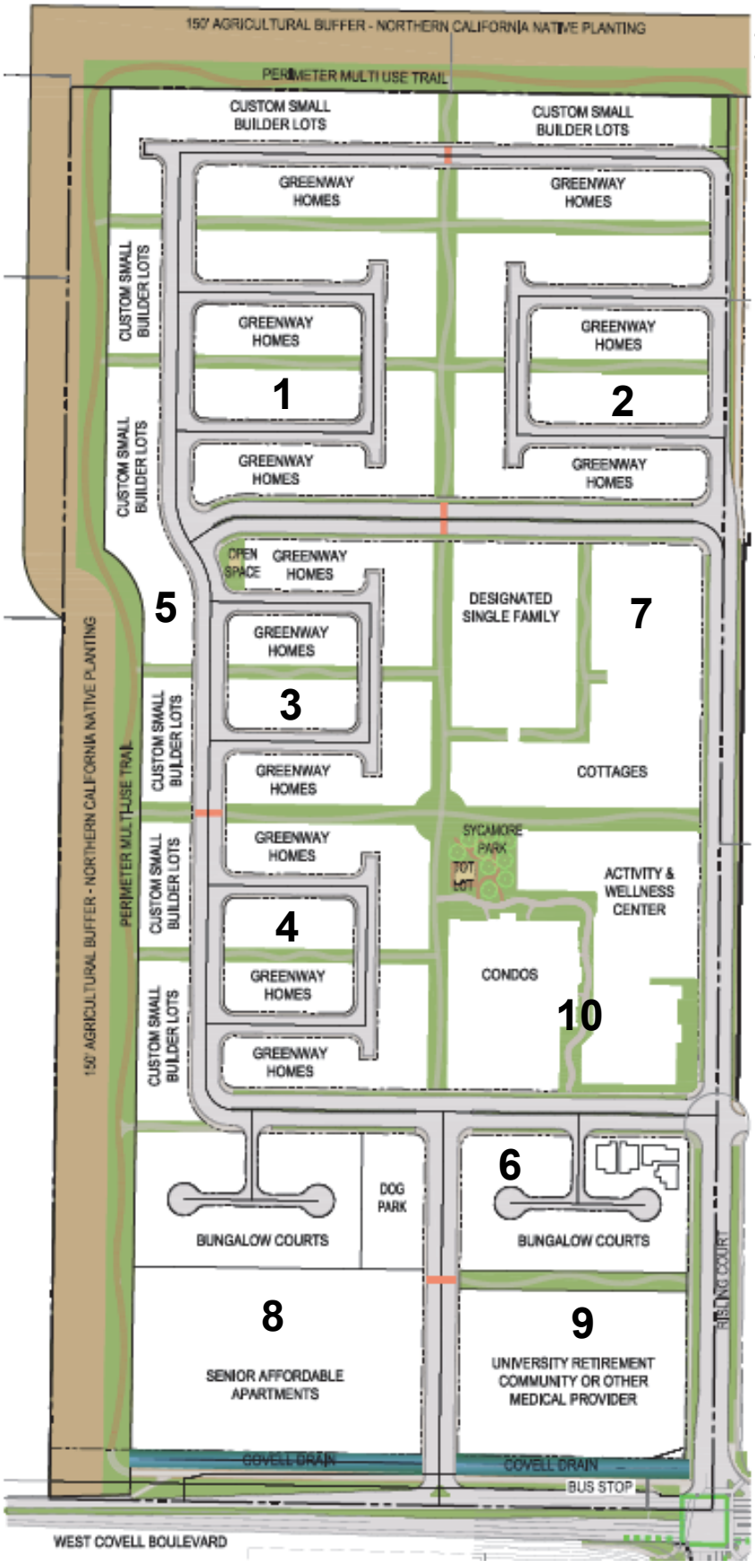
Figure Prepared: August 2017

: West Davis Active Adult Community (Current)

: West Davis Innovation Center (Former)

: 24-hr Noise Measurement Locations

: Short Term Noise Measurement Locations



PROJECT DATA

SITE AREA: 74.49 ACRES

CUSTOM SMALL BUILDER LOTS:
6.20 ACRES
52 UNITS
8.39± DUA

GREENWAY HOMES
16.20 ACRES
154 UNITS
9.51± DUA

BUNGALOW COURTS
4.30 ACRES
32 UNITS
7.44± DUA

COTTAGES
3.05 ACRES
33 UNITS
10.82± DUA

CONDOS
1.64 ACRES
48 UNITS
29.27± DUA

DESIGNATED SINGLE FAMILY
1.86 ACRES
61 UNITS
32.80± DUA

SENIOR AFFORDABLE APARTMENTS
4.26 ACRES
150 UNITS
35.21± DUA

UNIVERSITY RETIREMENT COMMUNITY OR OTHER MEDICAL PROVIDER
3.03 ACRES
30 UNITS
9.90± DUA

ACTIVITY & WELLNESS CENTER
2.66 ACRES

GREENWAY
5.21 ACRES
7267 LINEAR FEET OF TRAIL

PERIMETER MULTI-USE TRAIL
2.95 ACRES
2569 LINEAR FEET OF TRAIL

AGRICULTURAL BUFFER
4.24 ACRES

DOG PARK
0.68 ACRES

TOT LOT/SYCAMORE PARK/OPEN SPACE
0.42 ACRES
320 LINEAR FEET OF TRAIL

LOCAL RIGHT OF WAY
12.63 ACRES

RISLING COURT RIGHT OF WAY
1.67 ACRES

COVELL BLVD RIGHT OF WAY
1.61 ACRES

EXISTING RISLING COURT RIGHT OF WAY
0.95 ACRES

EXISTING COVELL BLVD RIGHT OF WAY
0.93 ACRES

TOTAL: 560 UNITS
TOTAL TRAIL LINEAR FOOTAGE: 10156 LF

LEGEND
PROPERTY LINE
RIGHT-OF-WAY
RAISED CROSSWALK

NOTES:
1. DENSITY CALCULATIONS ARE BASED ON NET AREA (EXCLUDE PUBLIC RIGHT-OF-WAY AND GREEN SPACE)

N

West Davis Active Adult Community
Figure: 3.11-2
Project Site Plan

j.c. brennan & associates
consultants in acoustics

Date:
10/24/2017

On Wednesday, January 7th, 2015 j.c. brennan & associates, Inc., staff conducted short-term noise level measurements on the DIC project site. The noise level measurements were conducted to determine typical background average (L_{eq}), median (L_{50}) and maximum (L_{max}) noise levels during the daytime periods at the project site. Instrumentation consisted of a Larson Davis Laboratories (LDL) Model 824 precision integrating sound level meter which was calibrated in the field before use with an LDL CAL-200 acoustical calibrator. Table 3.11-2 shows the results of the short-term noise level measurements. Appendix A contains complete results of the noise monitoring.

Based upon field observations and the data in Table 3.11-2, the existing noise environment is primarily defined by traffic on State Route 113 (SR-113) and traffic on Covell Boulevard.

Existing Traffic Noise

Existing roadway noise levels were measured by J.C. Brennan & Associates, Inc. using the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108). The model is based on Calveno reference noise emission factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to receiver, and the acoustical characteristics of the site. The FHWA model was developed to predict hourly Leq values for free-flowing traffic conditions.

Traffic volumes for existing conditions on the local street system were obtained from a traffic study conducted by Fehr & Peers for the project site. Truck percentages and vehicle speeds on the local area roadway were estimated from field observations.

Traffic noise levels are predicted at the sensitive receptors located at an estimated distance along each project-area roadway segment. In some locations, sensitive receptors may be located at distances which vary from the assumed calculation distance and may experience shielding from intervening barriers or sound walls. The traffic noise analysis is representative of the majority of sensitive receptors located closest to the project-area roadway segments analyzed.

Land uses adjacent to some of the project-area roadways consist primarily of commercial and retail uses, which are generally not considered sensitive to traffic noise.

Table 3.11-3 shows the existing traffic noise levels in terms of Ldn along each roadway segment. This table also shows the distances to existing traffic noise contours. Appendix B shows the full inputs and results of the FHWA model.

TABLE 3.11-3: PREDICTED EXISTING TRAFFIC NOISE LEVELS

ROADWAY	SEGMENT - LOCATION	DISTANCE (FEET)	EXTERIOR NOISE LEVEL, DBA LDN	DISTANCE TO LDN NOISE CONTOURS (FEET) EXISTING (LDN)		
				70 DB	65 DB	60 DB
Anderson Rd	North of Covell Boulevard	100	56	11	25	53
Anderson Rd	South of Covell Boulevard	100	58	16	34	74
Covell Blvd	East of Anderson Road	100	62	28	61	132
Covell Blvd	West of Anderson Road	100	62	30	64	138
Covell Blvd	East of Denali Drive	100	63	36	78	167
Covell Blvd	West of Denali Drive	100	63	32	69	149
Covell Blvd	East of F Street	100	63	35	75	162
Covell Blvd	West of F Street	100	63	32	69	150
Covell Blvd	East of Lake Boulevard	100	62	31	66	142
Covell Blvd	West of Lake Boulevard	100	62	30	64	138
Covell Blvd	East of Sycamore Lane	100	62	30	65	140
Covell Blvd	West of J Street	100	63	35	75	162
F Street	North of Covell Boulevard	100	57	14	30	65
F Street	South of Covell Boulevard	100	57	14	30	64
Lake Blvd	North of Covell Boulevard	100	56	12	26	57
Lake Blvd	South of Covell Boulevard	100	56	12	26	57
Risling Ct	North of Covell Boulevard	100	48	4	8	16
Risling Ct	North of Sutter Hospital Dwy	100	47	3	6	13
Risling Ct	South of Sutter Hospital Dwy	100	48	4	8	16
Sycamore Ln	North of Covell Boulevard	100	55	10	22	47
SR-113	North of CR 31 / Covell Blvd.	180	68	142	307	1,423

NOTES:

1 DISTANCES ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS.

2 TRAFFIC NOISE LEVELS MAY VARY DEPENDING ON ACTUAL SETBACK DISTANCES AND LOCALIZED SHIELDING.

SOURCE: FEHR & PEERS, CALTRANS & J.C. BRENNAN & ASSOCIATES, INC., 2017.

3.11.2 REGULATORY SETTING

STATE

Governor's Office of Planning and Research (OPR)

The *State of California General Plan Guidelines* (State of California 1998), published by OPR provides guidance for the acceptability of projects within specific CNEL contours. The guidelines also present adjustment factors that may be used in order to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution.

LOCAL

City of Davis General Plan

The City of Davis General Plan contains the following goals, policies, and standards that are relevant to noise and vibration:

NOISE

Goal NOISE 1. Maintain community noise levels that meet health guidelines and allow for a high quality of life.

Policy NOISE 1.1 Minimize vehicular and stationary noise sources, and noise emanating from temporary activities.

Standards

a. The City shall strive to achieve the "normally acceptable" exterior noise levels shown in Table 19 of the General Plan [Table 3.11-4 of this report] and the target interior noise levels in Table 20 of the General Plan [Table 3.11-5 of this report] in future development areas and in currently developed areas.

b. New development shall generally be allowed only in areas where exterior and interior noise levels consistent with Table 19 of the General Plan [Table 3.11-5 of this report] and Table 20 of the General Plan [Table 3.11-6 of this report] can be achieved.

c. New development and changes in use shall generally be allowed only if they will not adversely impact attainment within the community of the exterior and interior noise standards shown in Table 19 of the General Plan [Table 3.11-4 of this report] and Table 20 of the General Plan [Table 3.11-5 of this report]. Cumulative and project specific impacts by new development on existing residential land uses shall be mitigated consistent with the standards in Table 19 of the General Plan [Table 3.11-4 of this report] and Table 20 of the General Plan [Table 3.11-5 of this report].

d. Required noise mitigation measures for new and existing housing shall be provided with the first stage and prior to completion of new developments or the completion of capacity-enhancing roadway changes wherever noise levels currently exceed or are projected within 5 years to exceed the normally acceptable exterior noise levels in Table 19 of the General Plan [Table 3.11-4 of this report].

TABLE 3.11-4: STANDARDS FOR EXTERIOR NOISE EXPOSURE (EXCERPT FROM CITY OF DAVIS GENERAL PLAN TABLE 19)

LAND USE CATEGORY	*COMMUNITY NOISE EXPOSURE LDN OR CNEL, DBA*			
	NORMALLY ACCEPTABLE	*CONDITIONALLY ACCEPTABLE*	*UNACCEPTABLE*	*CLEARLY UNACCEPTABLE*
Residential	Under 60	60-70*	70-75	Above 75
Transient Lodging – Motels, Hotels	Under 60	65-75	75-80	Above 80
Schools, Libraries, Churches, Hospitals, Nursing Homes	Under 60	60-70	70-80	Above 80
Auditoriums, Concert Halls, Amphitheaters	Under 50	50-70	NA	Above 70
Sports Arenas, Outdoor Spectator Sports	NA	Under 75	NA	Above 75
Playgrounds, Neighborhood Parks	Under 70	NA	70-75	Above 75
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Under 70	NA	70-80	Above 80
Office Buildings, Business Commercial and Professional	Under 65	65-75	Above 75	NA
Industrial, Manufacturing, Utilities, Agriculture	Under 65	70-80	Above 80	NA

Normally Acceptable: Specified land use is satisfactory based upon the assumption that any buildings involved are of normal conventional construction, without special noise insulation requirements.
Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is conducted, and needed noise attenuation features are included in the construction or development.
Normally Unacceptable: New construction or development should be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be conducted and needed noise attenuation features shall be included in the construction or development.
Clearly Unacceptable: New construction or development shall not be undertaken.
NA: Not applicable
** The City Council shall have discretion within the "conditionally acceptable" range for residential use to allow levels in outdoor spaces to go up to 65 dBA if cost effective or aesthetically acceptable measures are not available to reduce noise levels in outdoor spaces to the "normally acceptable" levels. Outdoor spaces which are designed for visual use only (for example, streetside landscaping in an apartment project), rather than outdoor use space may be considered acceptable up to 70 dBA.*

SOURCE: CITY OF DAVIS, 2010

TABLE 3.11-5: STANDARDS FOR INTERIOR NOISE LEVELS (CITY OF DAVIS GENERAL PLAN TABLE 20)

USE	*NOISE LEVEL (DBA)*
Residences, schools through grade 12, hospitals and churches	45 Ldn
Offices	55 Leq

SOURCE: CITY OF DAVIS, 2010

Policy NOISE 1.2 Discourage the use of sound walls whenever alternative mitigation measures are feasible, while also facilitating the construction of sound walls where desired by the neighborhood and there is no other way to reduce noise to acceptable exterior levels shown in Table 19 of the General Plan [Table 3.11-4 of this report].

See the separate General Plan policy interpretation document titled "Major Arterial Landscaping, Noise Attenuation Design and Greenstreets".

Standards

a. Where sound walls are built, they should include dense landscaping along them to mitigate their visual impact, as illustrated in Figure 38 of the General Plan [Figure 3.11-3 of this report].

b. Where sound walls are built, they should provide adequate openings and visibility from surrounding areas to increase safety and access, as illustrated in Figure 38 of the General Plan [Figure 3.11-3 of this report]. Openings should be designed so as to maintain necessary noise attenuation.

c. Review sound walls and other noise mitigations through the design review process.

Figure 3.11-3
Sound Wall Design Concepts
(City of Davis General Plan Figure 38)

Minimal Landscaping and Inadequate Openings for Access

Dense Landscaping and Adequate Openings for Access

GOAL NOISE 2. Provide for indoor noise environments that are conducive to living and working.

Policy NOISE 2.1 Take all technically feasible steps to ensure that interior noise levels can be maintained at the levels shown in Table 20 of the General Plan [Table 3.11-5 of this report].

Standards

a. New residential development or construction shall include noise attenuation measures necessary to achieve acceptable interior noise levels shown in Table 20 of the General Plan [Table 3.11-5 of this report].

b. Existing areas that will be subjected to noise levels greater than the acceptable noise levels shown in Table 20 of the General Plan [Table 3.11-5 of this report] as a result of increased traffic on existing city streets (including streets remaining in existing configurations and streets being widened) shall be mitigated to the acceptable levels in Table 20 of the General Plan [Table 3.11-5 of this report]. If traffic increases are caused by specific projects, then the City shall be the lead agency in implementing cumulative noise mitigation projects. Project applicants shall pay their fair share for any mitigation.

City of Davis Noise Ordinance

Section 24 of the City of Davis City Code establishes a maximum noise level standard of 55 dB during the hours of 7:00 a.m. to 9:00 p.m., and 50 dB during the hours of 9:00 p.m. to 7:00 a.m. The ordinance defines maximum noise level as the "maximum continuous sound level or repetitive peak level produced by a sound source or group of sources. For the purposes of this analysis, J.C. Brennan & Associates, Inc. interpreted this definition to be equivalent to the average noise level descriptor, Leq. The City Code makes exemptions for certain typical activities which may occur within the city. These exemptions are listed in Article 24.02.040, Special Provisions, and are summarized below:

a) Normal operation of power tools for non-commercial purposes are typically exempted between the hours of 8 am and 8 pm unless the operation unreasonably disturbs the peace and quiet of any neighborhood.

b) Construction or landscape operations would be exempt during the hours of 7am to 7 pm Mondays through Fridays and between the hours of 8 am to 8 pm Saturdays and Sundays assuming that the operations are authorized by valid city permit or business license, or carried out by employees or contractors of the city and one of the following conditions apply (conditions summarized, please see section 24.02.040 of the City Code for the full text):

    1) No piece of equipment produces a noise level exceeding 83 dBA at 25-feet.

    2) The noise level at any point outside the property plane of the project shall not exceed 86 dBA.

    3) Requires that impact equipment and tools be fitted with the best available silencing equipment.

    4) Limits individual powered blowers to a noise level of 70 dBA at 50-feet.

    5) Prohibits more than one blower from simultaneously operating within 100-feet of another blower.

    6) On single-family residential property, the 70 dBA at 50-feet requirement would not apply to blowers operated on single-family residential property.

c) The City Code also exempts air conditioners, pool pumps, and similar equipment from the noise regulations, provided that they are in good working order.

d) Work related to public health and safety is exempt from the noise requirements.

e) Safety devices are exempt from the noise requirements.

f) Emergencies are exempt from the noise requirements.

3.11.3 IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Consistent with Appendix G of the CEQA Guidelines, the City's General Plan, and professional judgment, a significant impact would occur if the proposed project would result in the following:

- 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;
- Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- 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, expose people residing or working in the project area to excessive noise levels within two miles of a public airport or public use airport; or
- For a project within the vicinity of a private airstrip, 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 Davis General Plan, the City of Davis Noise Ordinance described in the Regulatory Framework section above (Section 3.11.2), and the following standards. Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels for adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local project criteria or ordinances, or substantially increase noise levels at noise sensitive land uses. The potential increase in traffic noise from the project is a factor in determining significance. Research into the human perception of changes in sound level indicates the following:

- A 3-dB change is barely perceptible,
- A 5-dB change is clearly perceptible, and
- A 10-dB change is perceived as being twice or half as loud.

A limitation of using a single noise level increase value to evaluate noise impacts is that it fails to account for pre-project-noise conditions. Table 3.11-6 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 Ldn.

TABLE 3.11-6: SIGNIFICANCE OF CHANGES IN NOISE EXPOSURE

AMBIENT NOISE LEVEL WITHOUT PROJECT, LDN	*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 Davis does not have specific policies pertaining to vibration levels. However, vibration levels associated with construction activities are discussed in this report.

Human and structural response to different vibration levels is influenced by a number of factors, including ground type, distance between source and receptor, duration, and the number of perceived vibration events. Table 3.11-7 indicates that the threshold for damage to structures ranges from 2 to 6 peak particle velocity in inches per second (in/sec p.p.v). One-half this minimum threshold or 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 occur is noted as 0.1 in/sec p.p.v.

TABLE 3.11-7: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

PEAK PARTICLE VELOCITY MM/SECOND	*PEAK PARTICLE VELOCITY IN/SECOND*	*HUMAN REACTION*	*EFFECT ON BUILDINGS*
0.15-0.30	0.006-0.019	Threshold of perception; possibility of intrusion	Vibrations unlikely to cause damage of any type
2.0	0.08	Vibrations readily perceptible	Recommended upper level of the vibration to which ruins and ancient monuments should be subjected
2.5	0.10	Level at which continuous vibrations begin to annoy people	Virtually no risk of "architectural" damage to normal buildings
5.0	0.20	Vibrations annoying to people in buildings (this agrees with the levels established for people standing on bridges and subjected to relative short periods of vibrations)	Threshold at which there is a risk of "architectural" damage to normal dwelling - houses with plastered walls and ceilings Special types of finish such as lining of walls, flexible ceiling treatment, etc., would minimize "architectural" damage
10-15	0.4-0.6	Vibrations considered unpleasant by people subjected to continuous vibrations and unacceptable to some people walking on bridges	Vibrations at a greater level than normally expected from traffic, but would cause "architectural" damage and possibly minor structural damage.

SOURCE: CALTRANS. TRANSPORTATION RELATED EARTHBORNE VIBRATIONS. TAV-02-01-R9601 FEBRUARY 20, 2002.

IMPACTS AND MITIGATION MEASURES

Impact 3.11-1: The proposed project may generate unacceptable traffic noise levels at existing receptors (Less than Significant)

Tables 3.11-8 and 3.11-9 show the increases in traffic noise levels due to the project. Table 3.11-8 shows the increases in traffic noise levels based upon the Existing and Existing Plus Approved Projects Plus Project Conditions, and Table 3.11-9 shows the increases in traffic noise levels based upon the Cumulative No Project and Cumulative Plus Project Conditions. Appendix B shows the full inputs and results of the FHWA model.

Based upon Tables 3.11-8 and 3.11-9, the overall predicted traffic noise levels will not exceed 65.1 dB Ldn/CNEL, which falls within the City of Davis "Conditionally Acceptable" noise level standard of 60-70 dB Ldn/CNEL. Furthermore, the predicted increases in traffic noise levels do not exceed the FICON standards for significance of changes in noise exposure in Table 3.11-6. The highest increase in traffic noise levels occurs on Risling Court under the Existing + Project conditions (+3.8 dB). However, this increase is not considered a significant increase in traffic noise levels. The highest predicted traffic noise levels are predicted along Covell Boulevard Court under the Cumulative +

Project conditions 65.1 dB). However, this increase is not considered a significant increase in traffic noise levels (+0.2 dB). At no point does the project result in an exceedance of the City of Davis exterior noise level standard. Therefore, this is a ***less than significant*** impact.

TABLE 3.11-8: PREDICTED EXISTING VS. EXISTING PLUS APPROVED PROJECTS PLUS PROJECT TRAFFIC NOISE LEVELS

ROADWAY	SEGMENT	DISTANCE (FEET)	EXTERIOR NOISE LEVEL, DBA LDN			DISTANCE TO CONTOURS (FEET) EXISTING			DISTANCE TO CONTOURS (FEET) EXISTING PLUS APPROVED PROJECTS PLUS PROJECT		
			EXISTING	EXISTING PLUS APPROVED PROJECTS PLUS PROJECT	CHANGE	70 LDN	65 LDN	60 LDN	70 LDN	65 LDN	60 LDN
Anderson Rd	North of Covell Blvd	100	55.9	55.7	-0.2	11	25	53	11	24	51
Anderson Rd	South of Covell Blvd	100	58.0	58.2	+0.2	16	34	74	16	35	76
Covell Blvd	East of Anderson Rd	100	61.8	62.1	+0.3	28	61	132	30	64	139
Covell Blvd	West of Anderson Rd	100	62.1	62.4	+0.3	30	64	138	31	68	146
Covell Blvd	East of Denali Dr	100	63.3	63.6	+0.3	36	78	167	37	81	174
Covell Blvd	West of Denali Dr	100	62.6	62.8	+0.2	32	69	149	33	72	154
Covell Blvd	East of F St	100	63.2	63.4	+0.2	35	75	162	36	78	169
Covell Blvd	West of F St	100	62.6	63.0	+0.4	32	69	150	34	73	158
Covell Blvd	East of Lake Blvd	100	62.3	62.5	+0.2	31	66	142	32	68	146
Covell Blvd	East of Oak Avenue	100	62.1	62.5	+0.4	30	64	138	31	68	146
Covell Blvd	East of Sycamore Ln	100	62.2	62.5	+0.3	30	65	140	32	68	147
Covell Blvd	West of J St	100	63.2	63.4	+0.2	35	75	162	37	79	169
F Street	North of Covell Blvd	100	57.2	57.3	+0.1	14	30	65	14	31	66
F Street	South of Covell Blvd	100	57.1	57.5	+0.4	14	30	64	15	32	68
Lake Blvd	North of Covell Blvd	100	56.3	56.3	0	12	26	57	12	26	57
Lake Blvd	South of Covell Blvd	100	56.3	56.5	+0.2	12	26	57	13	27	59
Project Dwy	North of Covell Blvd	100	NA	47.4	NA	NA	NA	NA	3	7	14

NOTES:

[1] DISTANCES TO TRAFFIC NOISE CONTOURS ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS.

[2] TRAFFIC NOISE LEVELS MAY VARY DEPENDING ON ACTUAL SETBACK DISTANCES AND LOCALIZED SHIELDING.

** ACCOUNTS FOR SHIELDING DUE TO EXISTING INTERVENING STRUCTURES AT ELEVATED LOCATIONS AND EXISTING SOUND WALL AT GROUND FLOOR LOCATIONS.*

SOURCE: CITY OF DAVIS, CALTRANS & J.C. BRENNAND & ASSOCIATES, INC., 2017.

TABLE 3.11-8: PREDICTED EXISTING VS. EXISTING PLUS APPROVED PROJECTS PLUS PROJECT TRAFFIC NOISE LEVELS (CONTINUED)

ROADWAY	SEGMENT	DISTANCE (FEET)	EXTERIOR NOISE LEVEL, DBA LDN			DISTANCE TO CONTOURS (FEET) EXISTING			DISTANCE TO CONTOURS (FEET) EXISTING PLUS APPROVED PROJECTS PLUS PROJECT		
			EXISTING	EXISTING PLUS APPROVED PROJECTS PLUS PROJECT	CHANGE	70 LDN	65 LDN	60 LDN	70 LDN	65 LDN	60 LDN
Risling Ct	North of Covell Blvd	100	48.2	52.1	+0.3	4	8	16	6	14	30
Risling Ct	North of Sutter H. Dwy	100	46.6	49.1	+2.5	3	6	13	4	9	19
Risling Ct	South of Sutter H. Dwy	100	48.2	52.0	+3.8	4	8	16	6	14	29
Sutter H. Dwy	West of Risling Ct.	100	NA	47.9	NA	NA	NA	NA	3	7	16
Sycamore Ln	North of Covell Blvd	100	55.1	55.5	+0.4	10	22	47	11	23	50

NOTES:

[1] DISTANCES TO TRAFFIC NOISE CONTOURS ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS.

[2] TRAFFIC NOISE LEVELS MAY VARY DEPENDING ON ACTUAL SETBACK DISTANCES AND LOCALIZED SHIELDING.

** ACCOUNTS FOR SHIELDING DUE TO EXISTING INTERVENING STRUCTURES AT ELEVATED LOCATIONS AND EXISTING SOUND WALL AT GROUND FLOOR LOCATIONS.*

SOURCE: CITY OF DAVIS, CALTRANS & J.C. BRENNAND & ASSOCIATES, INC., 2017.

TABLE 3.11-9: PREDICTED CUMULATIVE NO PROJECT VS. CUMULATIVE PLUS PROJECT TRAFFIC NOISE LEVELS

ROADWAY	SEGMENT	DISTANCE (FEET)	EXTERIOR NOISE LEVEL, DBA LDN			DISTANCE TO CONTOURS (FEET) CUMULATIVE NO PROJECT			DISTANCE TO CONTOURS (FEET) CUMULATIVE PLUS PROJECT		
			CUMULATIVE NO PROJECT	CUMULATIVE PLUS PROJECT	CHANGE	70 LDN	65 LDN	60 LDN	70 LDN	65 LDN	60 LDN
Anderson Rd	North of Covell Blvd	100	56.4	56.4	0	12	27	57	12	27	57
Anderson Rd	South of Covell Blvd	100	59.7	59.7	0	20	44	95	21	44	96
Covell Blvd	East of Anderson Rd	100	62.8	62.9	+0.1	33	72	155	34	73	157
Covell Blvd	West of Anderson Rd	100	63.3	63.4	+0.1	36	77	165	36	78	169
Covell Blvd	East of Denali Dr	100	64.9	65.1	+0.2	46	99	212	47	101	217
Covell Blvd	West of Denali Dr	100	64.1	64.2	+0.1	40	87	187	41	89	191
Covell Blvd	East of F St	100	64.6	64.6	0	43	93	201	44	94	202
Covell Blvd	West of F St	100	63.9	63.9	0	39	84	182	39	85	183
Covell Blvd	East of Lake Blvd	100	63.8	63.9	+0.1	38	83	178	39	84	182
Covell Blvd	East of Oak Avenue	100	63.2	63.3	+0.1	35	76	164	36	77	166
Covell Blvd	East of Sycamore Ln	100	63.5	63.6	+0.1	37	79	171	38	81	174
Covell Blvd	West of J St	100	64.5	64.6	+0.1	43	93	200	43	93	201
F Street	North of Covell Blvd	100	58.0	58.0	0	16	34	73	16	34	73
F Street	South of Covell Blvd	100	57.7	57.7	0	15	32	70	15	33	70
Lake Blvd	North of Covell Blvd	100	57.5	57.5	0	15	32	70	15	32	68
Lake Blvd	South of Covell Blvd	100	58.3	58.4	+0.1	17	36	77	17	36	79
Project Dwy	North of Covell Blvd	100	NA	47.4	NA	NA	NA	NA	3	7	14

NOTES:

[1] DISTANCES TO TRAFFIC NOISE CONTOURS ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS.

[2] TRAFFIC NOISE LEVELS MAY VARY DEPENDING ON ACTUAL SETBACK DISTANCES AND LOCALIZED SHIELDING.

** ACCOUNTS FOR SHIELDING DUE TO EXISTING INTERVENING STRUCTURES AT ELEVATED LOCATIONS AND EXISTING SOUND WALL AT GROUND FLOOR LOCATIONS.*

SOURCE: CITY OF DAVIS, CALTRANS & J.C. BRENNAND & ASSOCIATES, INC., 2017.

TABLE 3.11-9: PREDICTED CUMULATIVE NO PROJECT VS. CUMULATIVE PLUS PROJECT TRAFFIC NOISE LEVELS (CONTINUED)

ROADWAY	SEGMENT	DISTANCE (FEET)	EXTERIOR NOISE LEVEL, DBA LDN			DISTANCE TO CONTOURS (FEET) EXISTING			DISTANCE TO CONTOURS (FEET) EXISTING PLUS APPROVED PROJECTS PLUS PROJECT		
			CUMULATIVE NO PROJECT	CUMULATIVE PLUS PROJECT	CHANGE	70 LDN	65 LDN	60 LDN	70 LDN	65 LDN	60 LDN
Risling Ct	North of Covell Blvd	100	52.9	54.4	+1.5	7	16	34	9	20	42
Risling Ct	North of Sutter H. Dwy	100	49.2	50.8	+1.6	4	9	19	5	11	24
Risling Ct	South of Sutter H. Dwy	100	52.9	54.3	+1.4	7	16	34	9	19	42
Sutter H. Dwy	West of Risling Ct.	100	NA	47.9	NA	NA	NA	NA	3	7	16
Sycamore Ln	North of Covell Blvd	100	56.6	56.6	0	13	28	59	13	28	59

[1] *DISTANCES TO TRAFFIC NOISE CONTOURS ARE MEASURED IN FEET FROM THE CENTERLINES OF THE ROADWAYS.*

[2] *TRAFFIC NOISE LEVELS MAY VARY DEPENDING ON ACTUAL SETBACK DISTANCES AND LOCALIZED SHIELDING.*

** ACCOUNTS FOR SHIELDING DUE TO EXISTING INTERVENING STRUCTURES AT ELEVATED LOCATIONS AND EXISTING SOUND WALL AT GROUND FLOOR LOCATIONS.*

SOURCE: CITY OF DAVIS, CALTRANS & J.C. BRENNAND & ASSOCIATES, INC., 2017.

Impact 3.11-2: Construction of the project may generate significant noise (Less than Significant)

The proposed new development, maintenance of roadways during construction, installation of public utilities, and infrastructure improvements associated with the project will require construction activities. These activities include the use of heavy equipment and impact tools. Table 3.11-10 provides a list of the types of equipment which may be associated with construction activities and the associated noise levels.

TABLE 3.11-10: CONSTRUCTION EQUIPMENT NOISE

TYPE OF EQUIPMENT	*PREDICTED NOISE LEVELS, LMAX DB*				*DISTANCES TO NOISE CONTOURS (FEET)*	
	NOISE LEVEL AT 50'	*NOISE LEVEL AT 100'*	*NOISE LEVEL AT 200'*	*NOISE LEVEL AT 400'*	*70 DB LMAX CONTOUR*	*65 DB LMAX CONTOUR*
Backhoe	78	72	66	60	126	223
Compactor	83	77	71	65	223	397
Compressor (air)	78	72	66	60	126	223
Concrete Saw	90	84	78	72	500	889
Dozer	82	76	70	64	199	354
Dump Truck	76	70	64	58	100	177
Excavator	81	75	69	63	177	315
Generator	81	75	69	63	177	315
Jackhammer	89	83	77	71	446	792
Pneumatic Tools	85	79	73	67	281	500

SOURCE: ROADWAY CONSTRUCTION NOISE MODEL USER'S GUIDE. FEDERAL HIGHWAY ADMINISTRATION. FHWA-HEP-05-054. JANUARY 2006. J.C. BRENNAN & ASSOCIATES, INC. 2012.

Activities involved in project construction would typically generate maximum noise levels ranging from 76 to 90 dB at a distance of 50-feet. The nearest sensitive receptor would be located 80-feet to the south across Covell Boulevard from on-site construction activities. At 80-feet, construction related activities are predicted to generate maximum noise levels ranging between 72-86 dB Lmax.

Construction could result in periods of elevated ambient noise levels and the potential for annoyance. However, the City of Davis Noise Ordinance establishes allowable hours of operation and noise limits for construction activities as follows:

24.02.040 Special provisions.

(b) Construction and landscape maintenance equipment. Notwithstanding any other provision of this chapter, between the hours of 7:00 a.m. and 7:00 p.m. on Mondays through Fridays, and between the hours of 8:00 a.m. and 8:00 p.m. on Saturdays and Sundays, construction, alteration, repair or maintenance activities which are authorized by valid city permit or business license, or carried out by employees of contractors of the city shall be allowed if they meet at least one of the following noise limitations:

(1) No individual piece of equipment shall produce a noise level exceeding eighty-three dBA at a distance of twenty-five feet. If the device is housed within a structure on the property, the measurement shall be made outside the structure at a distance as close to twenty feet from the equipment as possible.

(2) The noise level at any point outside of the property plane of the project shall not exceed eighty-six dBA.

(3) The provisions of subdivisions (1) and (2) of this subsection shall not be applicable to impact tools and equipment; provided, that such impact tools and equipment shall have intake and exhaust mufflers recommended by manufacturers thereof and approved by the director of public works as best accomplishing maximum noise attenuation, and that pavement breakers and jackhammers shall also be equipped with acoustically attenuating shields or shrouds recommended by the manufacturers thereof and approved by the director of public works as best accomplishing maximum noise attenuation. In the absence of manufacturer's recommendations, the director of public works may prescribe such means of accomplishing maximum noise attenuation as he/she may determine to be in the public interest.

Construction projects located more than two hundred feet from existing homes may request a special use permit to begin work at six a.m. on weekdays from June 15th until September 1st. No percussion type tools (such as ramsets or jackhammers) can be used before 7:00 a.m. The permit shall be revoked if any noise complaint is received by the police department.

(4) No individual powered blower shall produce a noise level exceeding seventy dBA measured at a distance of fifty feet.

(5) No powered blower shall be operated within one hundred feet radius of another powered blower simultaneously.

(6) On single-family residential property, the seventy dBA at fifty feet restriction shall not apply if operated for less than ten minutes per occurrence.

Because all construction activities will be subject to the requirements of the City of Davis Municipal Code Section 24.02.040 with respect to limits on construction noise, this would be a ***less than significant*** impact.

Impact 3.11-3: Construction of the project may result in vibration impacts (Less than Significant)

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as demolition, grading, utilities placement, and parking lot construction occur. Sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located approximately 80-feet or further from the project site. At distances of over 50-feet, construction vibrations are not predicted to exceed acceptable levels. Additionally, construction activities would be temporary in nature and would likely occur during normal daytime working hours.

Construction vibration impacts include human annoyance and building structural damage. Human annoyance occurs when construction vibration rises significantly above the threshold of perception. Building damage can take the form of cosmetic or structural. Table 3.11-11 shows the typical vibration levels produced by construction equipment.

TABLE 3.11-11: VIBRATION LEVELS FOR VARYING CONSTRUCTION EQUIPMENT

TYPE OF EQUIPMENT	*PEAK PARTICLE VELOCITY @ 25 FEET (INCHES/SECOND)*	*PEAK PARTICLE VELOCITY @ 50 FEET (INCHES/SECOND)*	*PEAK PARTICLE VELOCITY @ 100 FEET (INCHES/SECOND)*
Large Bulldozer	0.089	0.031	0.011
Loaded Trucks	0.076	0.027	0.010
Small Bulldozer	0.003	0.001	0.000
Auger/drill Rigs	0.089	0.031	0.011
Jackhammer	0.035	0.012	0.004
Vibratory Hammer	0.070	0.025	0.009
Vibratory Compactor/roller	0.210	0.074	0.026

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

The Table 3.11-11 data indicate that construction vibration levels anticipated for the project are less than the 0.2 in/sec p.p.v. threshold of damage to buildings and less than the 0.1 in/sec threshold of annoyance criteria at distances of 50-feet. Therefore, construction vibrations are not predicted to cause damage to existing buildings or cause annoyance to sensitive receptors provided that the compactor/roller is located a minimum distance of 50-feet from other structures. Therefore, this impact would be considered ***less than significant*.**

Impact 3.11-4: The project may result in traffic noise at new sensitive receptors (Potentially Significant)

Figure 3.11-2 depicts the project site plan and proposed parcel designations. A finalized site plan depicting building elevations and floor plans is not currently available for the project site. Therefore, traffic noise levels at the typical building facades adjacent to Covell Boulevard are estimated at a typical setback of 20-feet from the right-of-way. Traffic noise levels from Risling Place do not exceed the noise level standards, and S.R. 113 does not contribute to the overall traffic noise levels.

Covell Boulevard

Table 3.11-12 shows the predicted Cumulative + Project noise levels at the building facades due to traffic on Covell Boulevard.

TABLE 3.11-12: PREDICTED CUMULATIVE + PROJECT TRAFFIC NOISE LEVELS – COVELL BOULEVARD

LOCATION	PREDICTED NOISE LEVELS	
	1ST FLOOR FACADES	2ND FLOOR FACADES
Parcels 8 & 9	64 dB Ldn	66 dB Ldn

SOURCE: J.C. BRENNAN & ASSOCIATES, INC. – 2017.

Based upon the data in Table 3.11-12, the predicted Cumulative + Project traffic noise levels for parcels 8 and 9, which are adjacent to Covell Boulevard, fall within the "Conditionally Acceptable" range of City standards. However this would potentially exceed the normally acceptable level of 60 dB Ldn.

Mitigation Measures

Implementation of the following mitigation measures will reduce the traffic noise levels to less than significant:

Mitigation 3-11-1 - Since the 60 dB Ldn standard is applied at the outdoor activity areas, the project can shield the outdoor activity areas of Parcels 8 and 9 adjacent to Covell Boulevard using the building facades. As an alternative, a barrier 6-feet in height can be constructed along the property line of Covell Boulevard. No second floor balconies of multi-family dwellings should face Covell Boulevard.

This will result in a Less than Significant Impact.

A typical residential building facade can expect an exterior to inter noise level reduction of 25 dB with the windows and doors in the closed position and air conditioning to allow for the appropriate acoustical isolation. Therefore, interior noise levels are expected to comply with the interior noise level standard of 45 dB Ldn.

Impact 3.11-5: The project may result in noise from on-site activities at sensitive receptors (Potentially Significant)

Figure 3.11-3 depicts the project site plan and proposed parcel designations. A finalized site plan depicting building elevations and floor plans is not currently available for the project site. Therefore, building facades are estimated at the parcel boundaries in Figure 3.11-3.

On-site noise sources, which we have identified, are associated with the proposed Activity and Wellness Center located on Parcel 10. These on-site noise sources are generated by mechanical equipment, parking lot use, and swimming pool activities at the Activity and Wellness Center. Additional on-site noise sources are associated with activity at the proposed dog park on Parcel 6.

Mechanical Equipment

The proposed West Davis Active Adult Community (WDAAC) Project includes the construction of the Activity and Wellness Center on Parcel 10. See Figure 3.11-3. The Activity and Wellness Center is comprised of a health club, restaurant, and clubhouse, primarily for use by on-site residents. It is expected that the primary noise source associated with these uses will be due to heating, air conditioning, and ventilation equipment. These types of equipment are often mounted on rooftops, located on the ground, or located within mechanical rooms. The noise sources can take the form of fans, pumps, air compressors, chillers, or cooling towers. Noise levels from these types of equipment can vary significantly and generally range between 45 dB to 70 dB at a distance of 50-feet. Shielding from rooftop parapets substantially reduces noise from these types of equipment. Based upon measurements conducted at various commercial and retail facilities, HVAC mechanical equipment is not expected to generate noise levels exceeding 45-50 dB Leq at distances beyond 50 feet from building facades.

For the purpose of this analysis, it is predicted that HVAC units are located on the rooftop of the Activity and Wellness Center, at a distance of 25 feet from the edge of the building. The rooftop is predicted to have an elevation of 20-feet, with parapets 3-feet in height along the perimeter of the rooftop for a total height of 23-feet. HVAC units are estimated to be 3-feet in height. The nearest noise sensitive receptor is predicted to be 50-feet from the Activity and Wellness Center. At this distance, HVAC noise levels would be approximately 35 dBA Leq, or less. This would comply with the City of Davis Noise Ordinance.

Swimming Pool

The proposed WDAAC Project includes the construction of an outdoor swimming pool as part of the proposed health club located on Parcel 10. The outdoor swimming pool is proposed primarily for use by on-site residents and the public. However, the pool is not intended for use in high attendance activities such as swim meets.

People using swimming pools generate noise, and additionally, pool equipment, such as electrical pumps, could be a significant noise source. To quantify likely noise levels from people using the pool facilities on the project site, j.c. brennan & associates, Inc. utilized noise level data collected for other pool facilities. The noise level measurements were conducted at a distance of 50-feet from the center of the pool. The results of the noise level measurements indicate that, during the busiest hour of operations, the measured sound level was 60 dB Leq. Because this noise level represents the busiest hour of pool activity, it is expected to approximately represent worst case noise levels associated with typical use of the proposed pool facilities. This could potentially exceed the City of Davis Noise Ordinance daytime standard of 55 dB Leq.

Mitigation Measures

Implementation of the following mitigation measures will reduce the swimming pool noise levels to less than significant.

Mitigation 3-11-3 - Pool use should be confined to the daytime hours of 7:00 a.m. to 9:00 a.m.

Implementation of the mitigation measures will reduce the pool noise levels to less than significant.

Dog Park

The proposed WDAAC Project also includes the construction of a dog park, intended for use by small dogs, adjacent to Parcel 6.

Interactions between dogs and humans at dog parks have the potential to generate significant noise levels at nearby sensitive receptors. To quantify likely noise levels from the dog park on the project site, j.c. brennan & associates, Inc. utilized noise level data collected at the Ashley Off-Leash Dog Park in Auburn, California. The primary noise sources at the dog park were caused by humans interacting with each other and with their pets. Dogs were observed to play quietly with other dogs, with occasional short barks or growls. The noise level measurements were conducted at a distance of 75-feet from the center of the dog park. The results of the noise level measurements indicate that, during the busiest hour of the day, the measured sound level was 53 dB Leq. Because this noise level represents the busiest hour of dog park activity, it is expected to approximately represent worst case noise levels associated with typical use of dog park facilities. This could potentially exceed the City of Davis Noise Ordinance daytime standard of 55 dB Leq.

Mitigation Measures

Implementation of the following mitigation measures will reduce the dog park noise levels to less than significant.

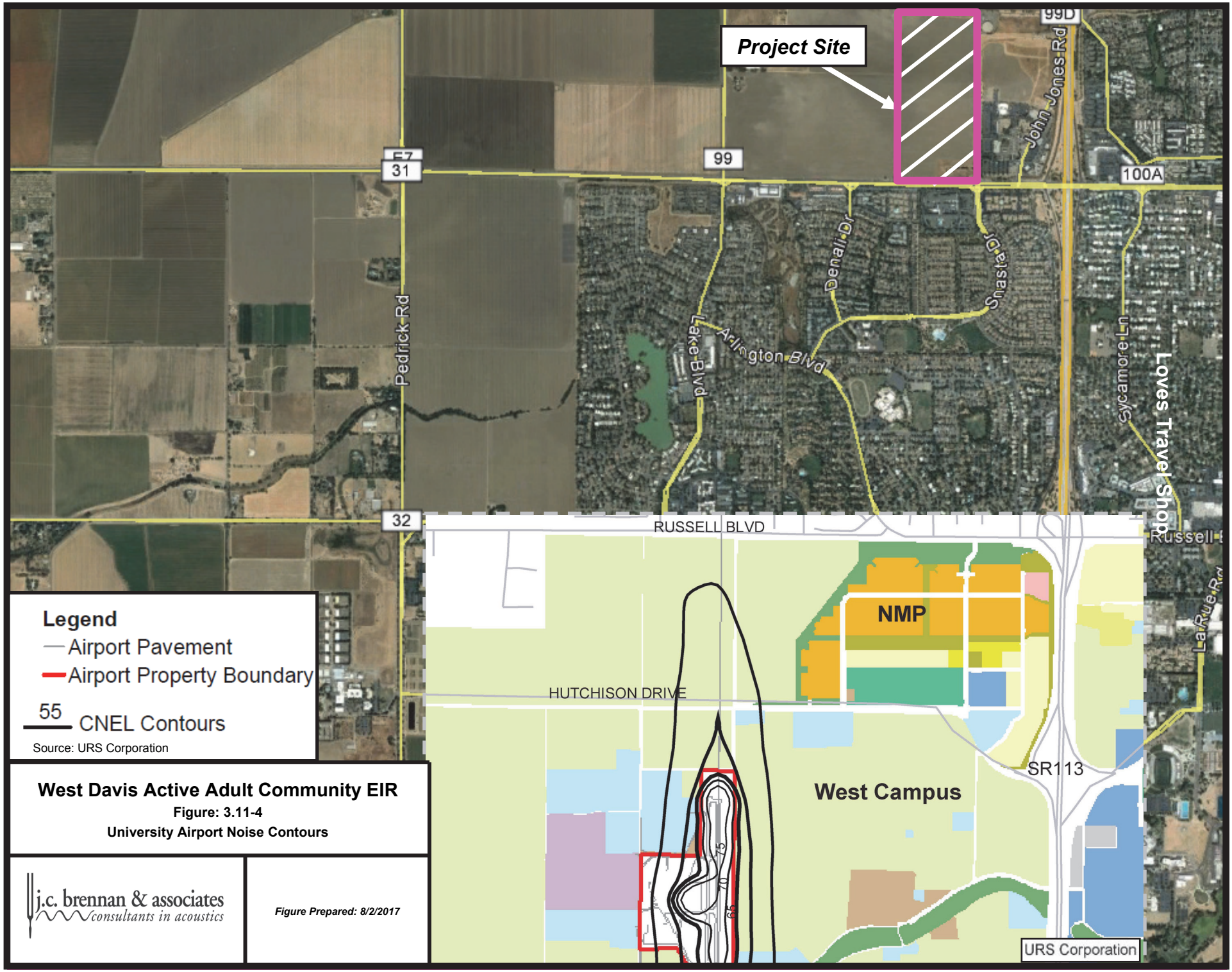
Mitigation 3-11-4 - Locating the center of the dog parkat a distance of 75-feet from the nearest building facade will reduce the dog park noise levels to within the daytime noise ordinance standard of 55 dB Leq.

Mitigation 3-11-5 - dog park use should be confined to the daytime hours of 7:00 a.m. to 9:00 a.m.

Implementation of the mitigation measures will reduce the pool noise levels to less than significant.

Impact 3.11-7: The project may be exposed to excessive noise levels due to aircraft noise (Less than Significant)

The proposed project is located within a two-mile radius of the University Airport. However, the project site is located outside of the 55 dB CNEL noise level contour, as shown in Figure 3.11-4. Therefore, this is a ***less than significant*** impact.



West Davis Active Adult Community EIR

Figure: 3.11-4

University Airport Noise Contours

j.c. brennan & associates
consultants in acoustics

Figure Prepared: 8/2/2017

Appendix A
West Davis Innovation Center
24hr Continuous Noise Monitoring - Site A
1/7/2015 - 1/8/2015

Hour	Leq	Lmax	L50	L90
10:00	63	78	61	49
11:00	63	79	60	48
12:00	64	81	61	49
13:00	62	76	60	48
14:00	63	78	61	49
15:00	64	82	62	52
16:00	65	78	63	55
17:00	64	79	63	54
18:00	64	77	62	53
19:00	62	72	60	52
20:00	61	72	58	50
21:00	60	72	57	48
22:00	59	72	55	47
23:00	57	80	50	44
0:00	56	74	47	42
1:00	54	70	44	41
2:00	51	72	41	39
3:00	53	76	45	41
4:00	54	75	46	43
5:00	59	78	52	47
6:00	61	75	57	51
7:00	65	86	62	55
8:00	65	80	64	58
9:00	63	76	61	54

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	65	60	63	61	51	57
Lmax (Maximum)	86	72	78	80	70	75
L50 (Median)	64	57	61	57	41	49
L90 (Background)	58	48	52	51	39	44

Computed Ldn, dB	65
% Daytime Energy	88%
% Nighttime Energy	12%

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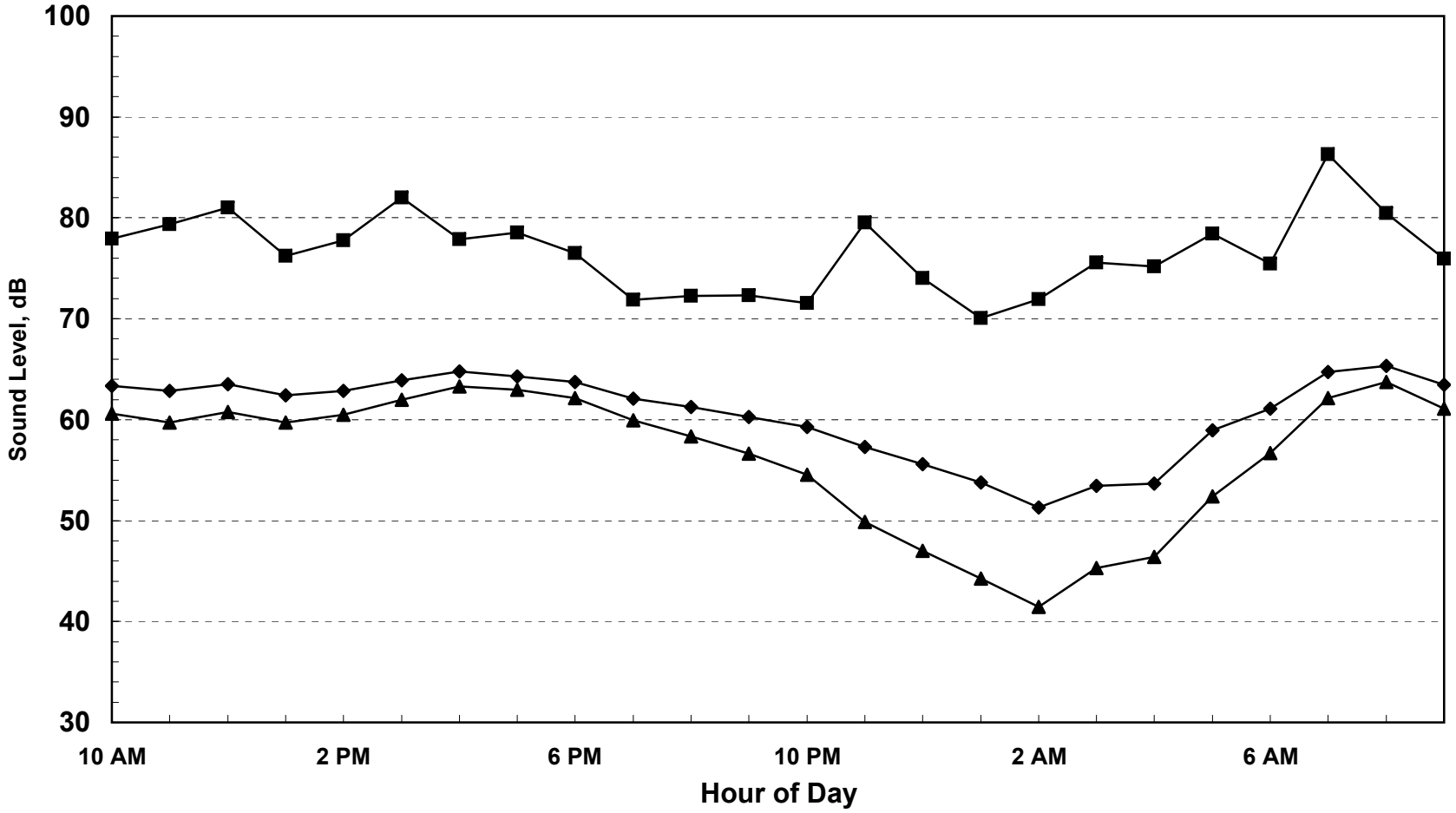
Appendix A
West Davis Innovation Center
24hr Continuous Noise Monitoring - Site A
1/7/2015 - 1/8/2015



Ldn = 65 dB

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Appendix A
West Davis Innovation Center
24hr Continuous Noise Monitoring - Site B
1/7/2015 - 1/8/2015

Hour	Leq	Lmax	L50	L90
11:00	63	77	60	54
12:00	63	74	61	54
13:00	62	74	60	55
14:00	63	78	61	56
15:00	63	86	62	57
16:00	64	74	63	60
17:00	66	79	65	62
18:00	65	75	64	61
19:00	62	73	61	55
20:00	61	71	60	56
21:00	60	71	59	54
22:00	59	73	58	53
23:00	58	71	56	49
0:00	57	70	54	46
1:00	56	77	51	43
2:00	56	72	52	44
3:00	59	72	55	45
4:00	61	74	59	54
5:00	65	77	63	57
6:00	64	73	63	58
7:00	66	82	65	60
8:00	66	77	65	61
9:00	64	72	62	57
10:00	63	83	61	56

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	66	60	64	65	56	61
Lmax (Maximum)	86	71	76	77	70	73
L50 (Median)	65	59	62	63	51	57
L90 (Background)	62	54	57	58	43	50

Computed Ldn, dB	68
% Daytime Energy	77%
% Nighttime Energy	23%

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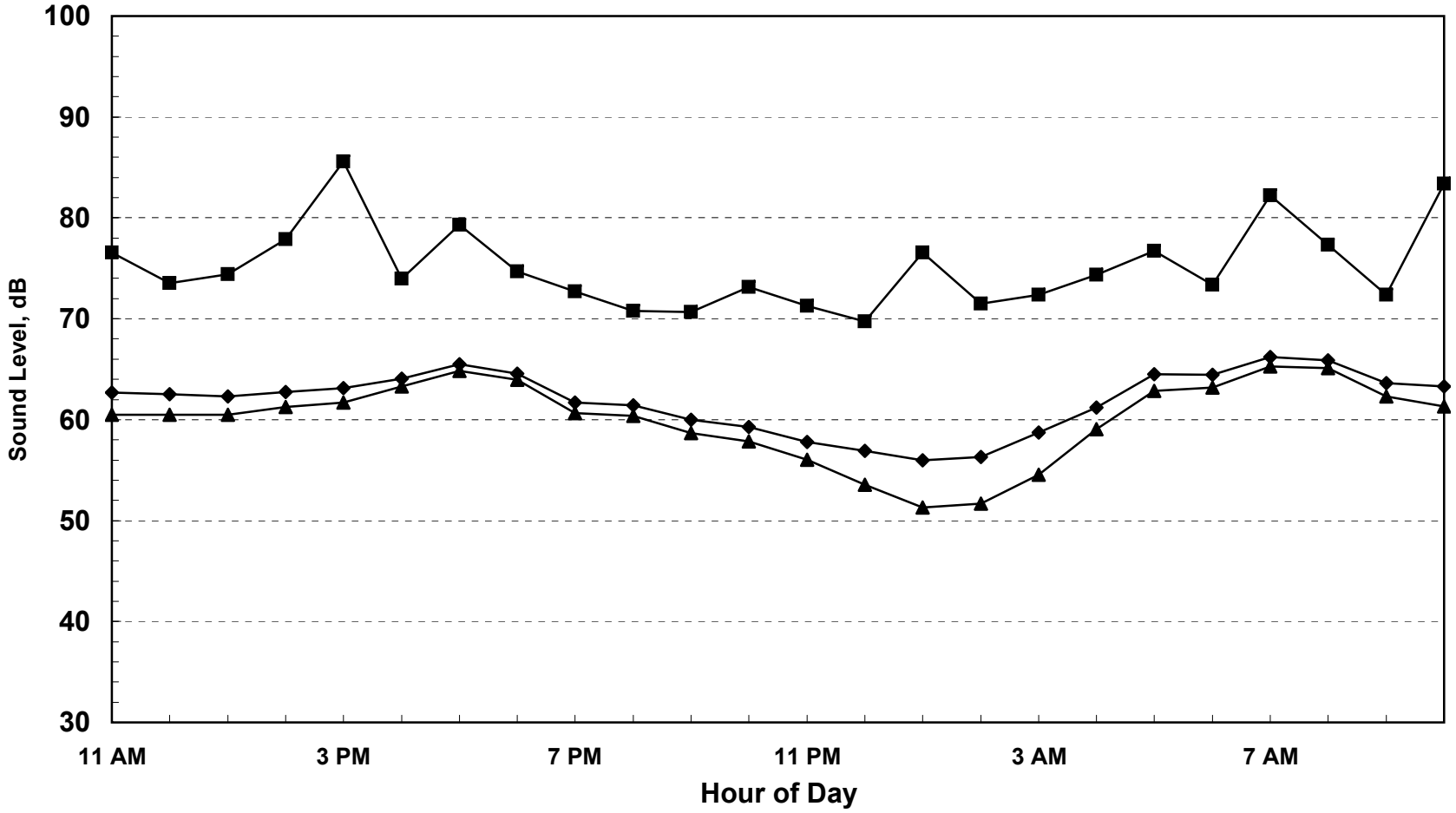
Appendix A

West Davis Innovation Center

24hr Continuous Noise Monitoring - Site B

1/7/2015 - 1/8/2015



Ldn = 68 dB

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Appendix A
Short-Term Noise Monitoring Summary

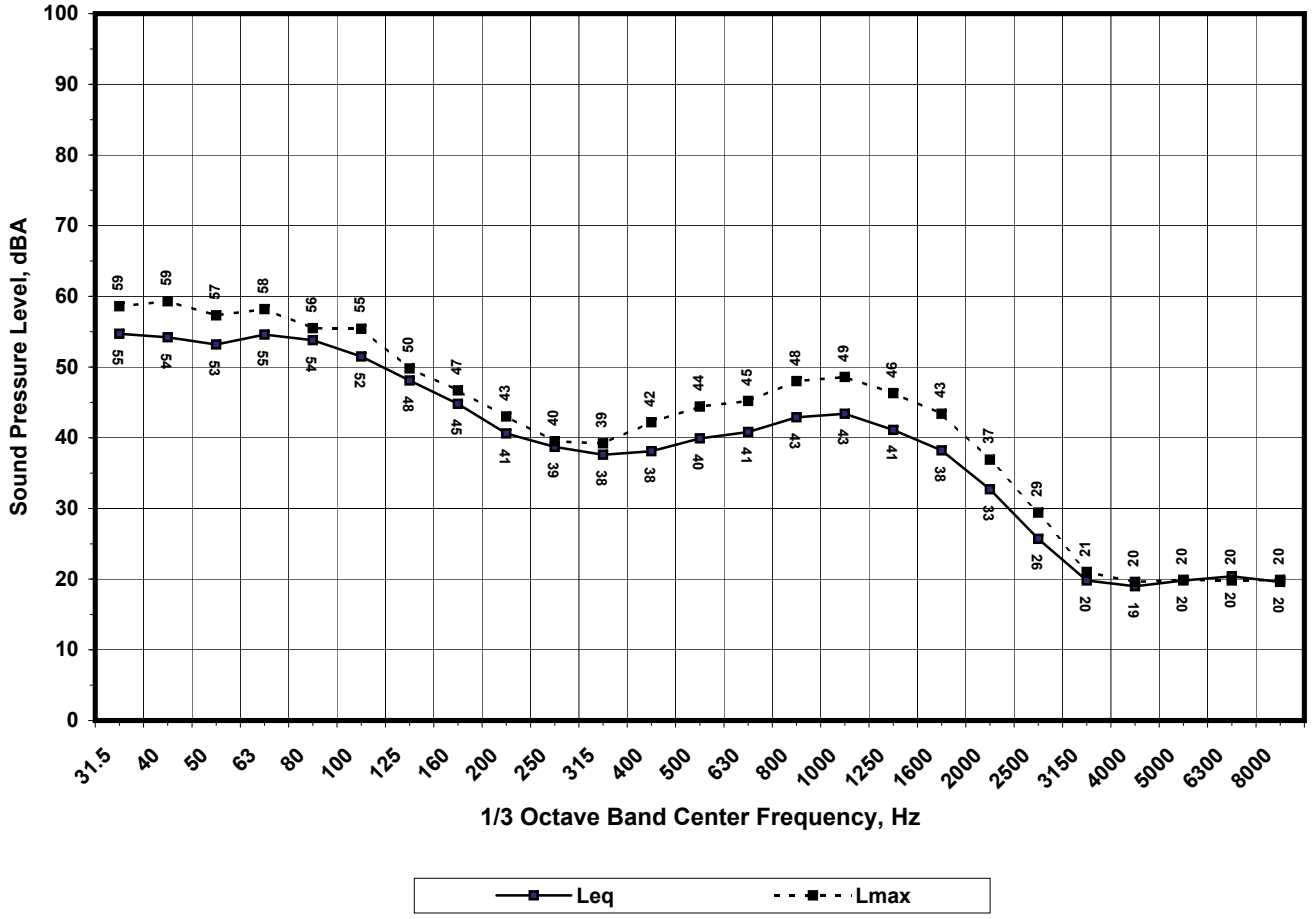
Project: 2017-112
Location: Site 1
Date: 1/8/2015
Time: 10:21 AM
SLM: 824-2

Calibrator: 200
Wind: Calm
Weather: 60F, Clear sky
Field Tech: WOO

Measurement Results, dBA

Duration: 10 minutes
L_{eq}: 50
L_{max}: 53
L_{min}: 46
L_{50}: 52
L_{90}: 48

Notes
Traffic from Hwy 113 is the dominant noise source.



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Appendix A
Short-Term Noise Monitoring Summary

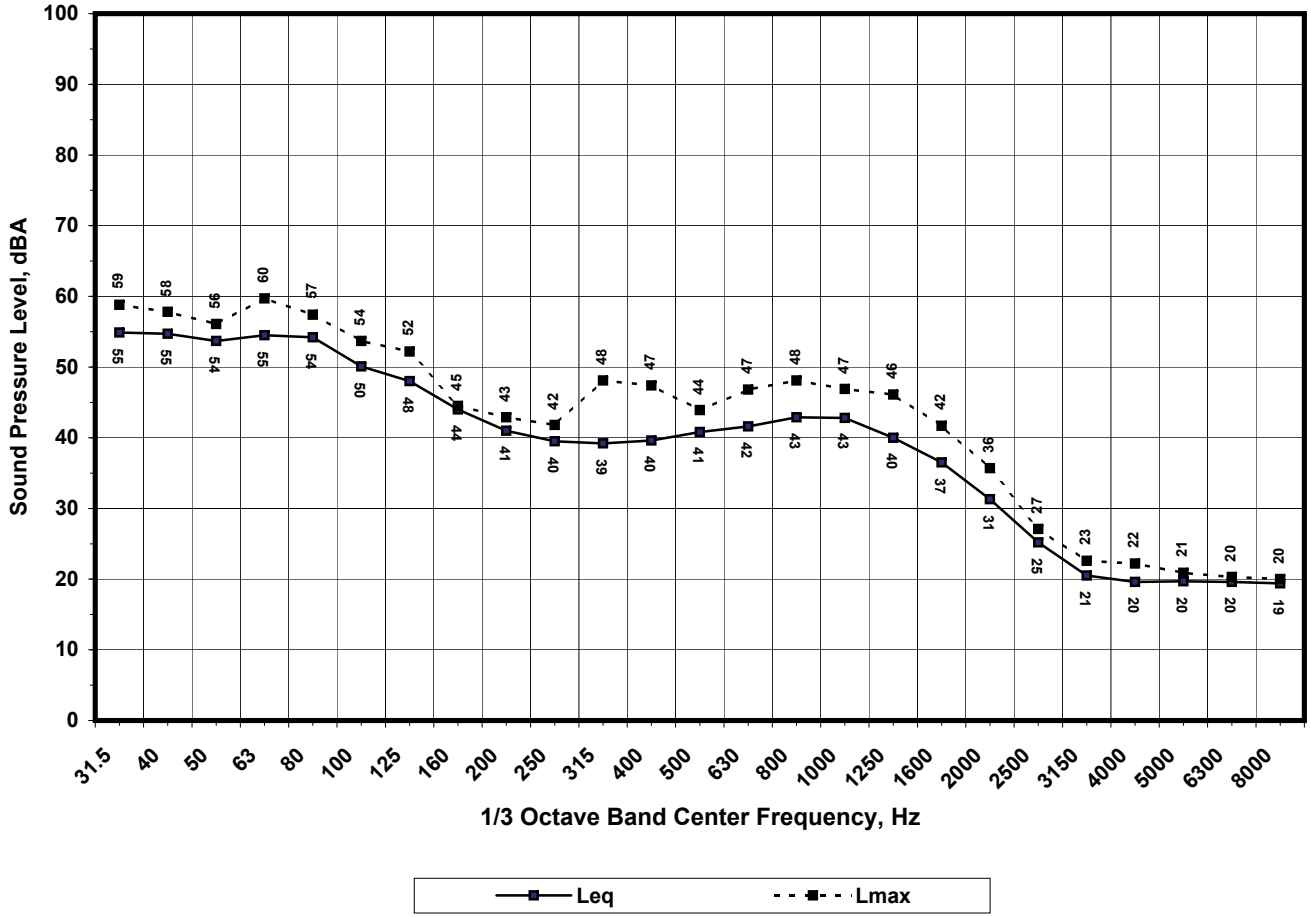
Project: 2017-112
Location: Site 2
Date: 1/8/2015
Time: 10:37 AM
SLM: 824-2

Calibrator: 200
Wind: Calm
Weather: 60F, Clear sky
Field Tech: WOO

Measurement Results, dBA

Duration: 10 minutes
L_{eq}: 49
L_{max}: 53
L_{min}: 46
L_{50}: 49
L_{90}: 47

Notes
Traffic from Hwy 113 is the dominant noise source.



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Appendix A
Short-Term Noise Monitoring Summary

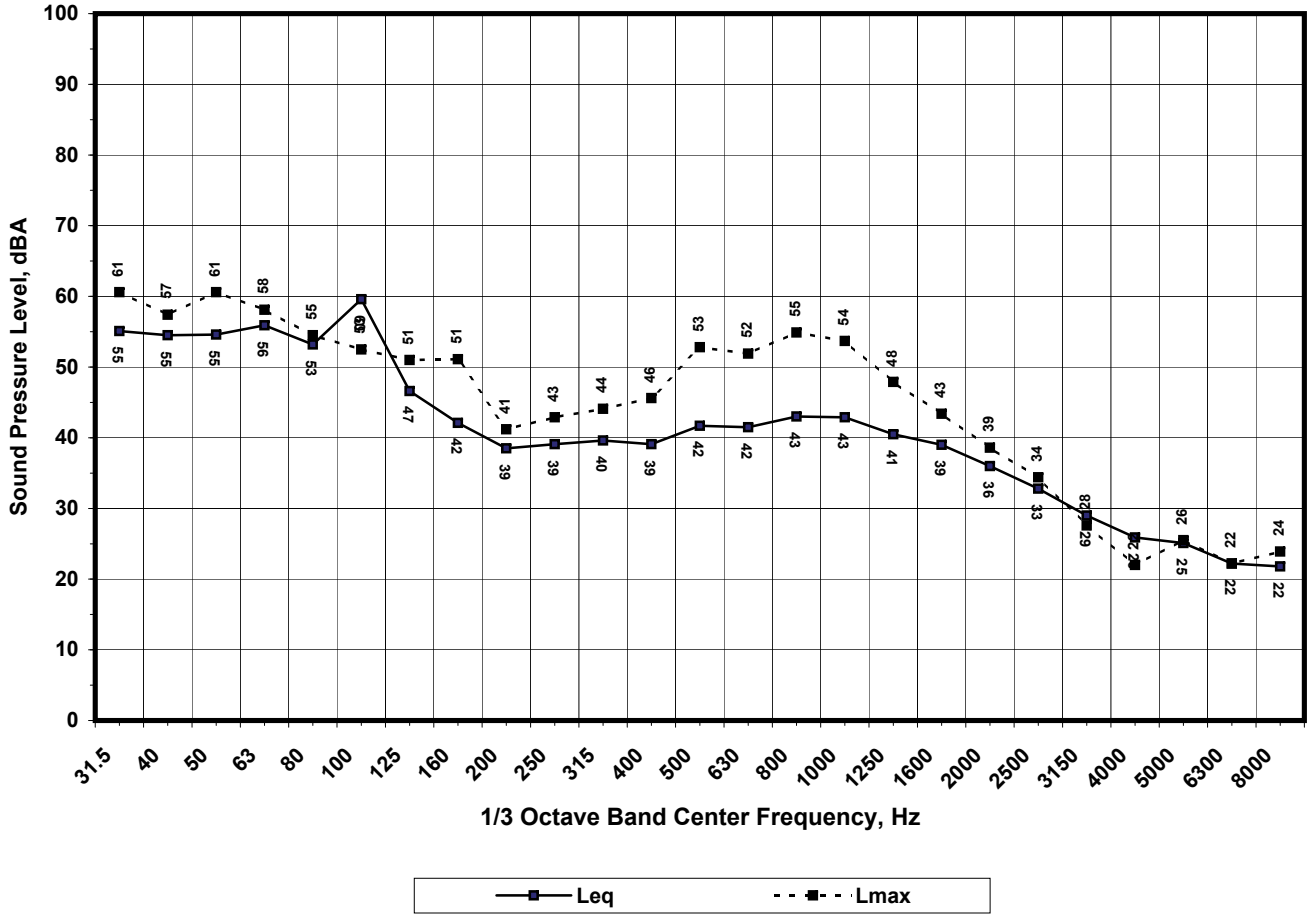
Project: 2017-112
Location: Site 3
Date: 1/8/2015
Time: 10:55 AM
SLM: 824-2

Calibrator: 200
Wind: Calm
Weather: 60F, Clear sky
Field Tech: WOO

Measurement Results, dBA

Duration: 10 minutes
L_{eq}: 50
L_{max}: 56
L_{min}: 46
L_{50}: 49
L_{90}: 47

Notes
Traffic from Hwy 113 is the dominant noise source.



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Appendix A
Short-Term Noise Monitoring Summary

Project: 2017-112
Location: Site 4
Date: 1/8/2015
Time: 11:33 AM
SLM: 824-2

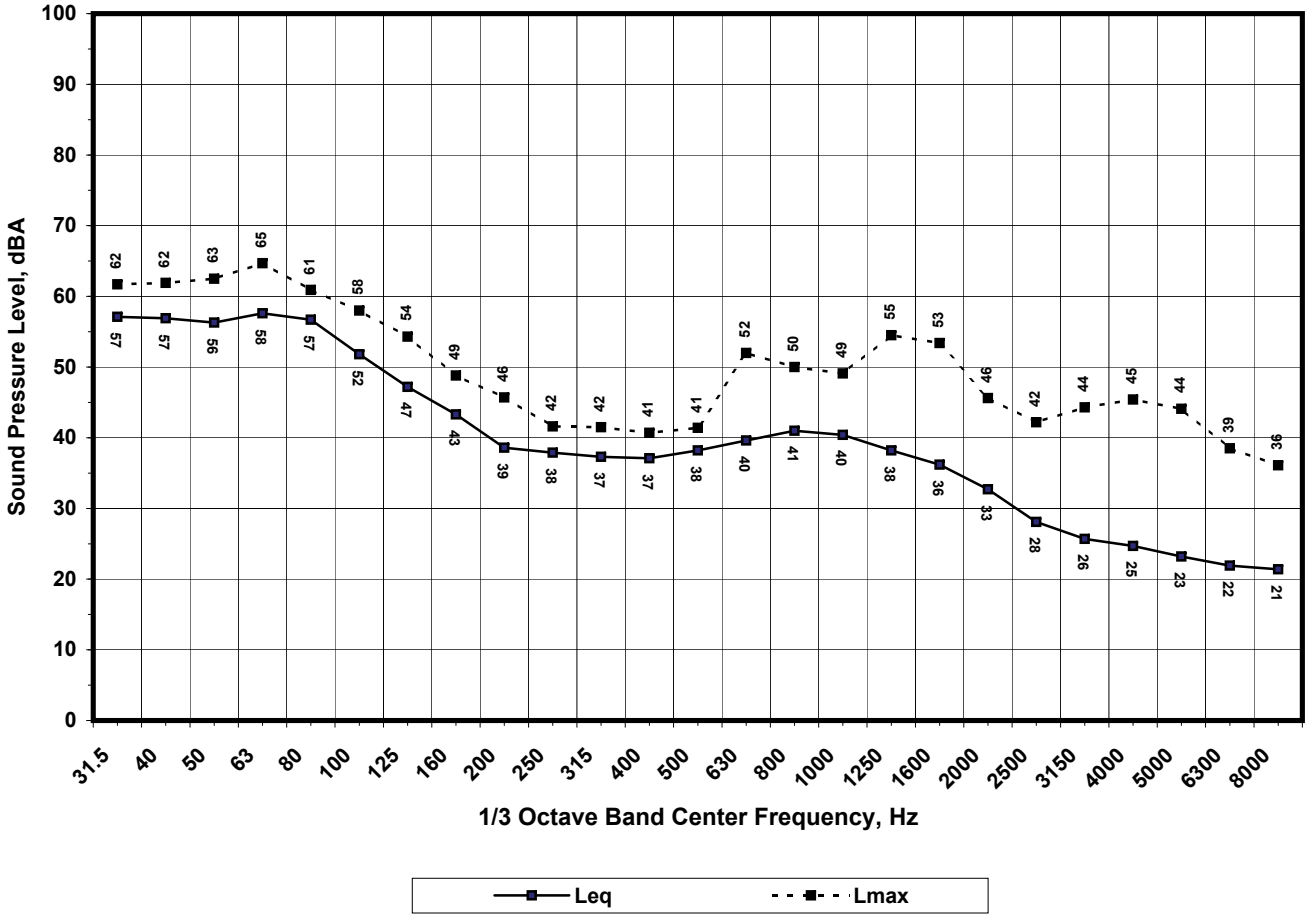
Calibrator: 200
Wind: Calm
Weather: 60F, Clear sky
Field Tech: WOO

Measurement Results, dBA

Duration: 10 minutes
L_{eq}: 48
L_{max}: 57
L_{min}: 44
L_{50}: 47
L_{90}: 45

Notes

Traffic from Hwy 113 is the dominant noise source. Traffic from parking lot is audible.



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Appendix A
Short-Term Noise Monitoring Summary

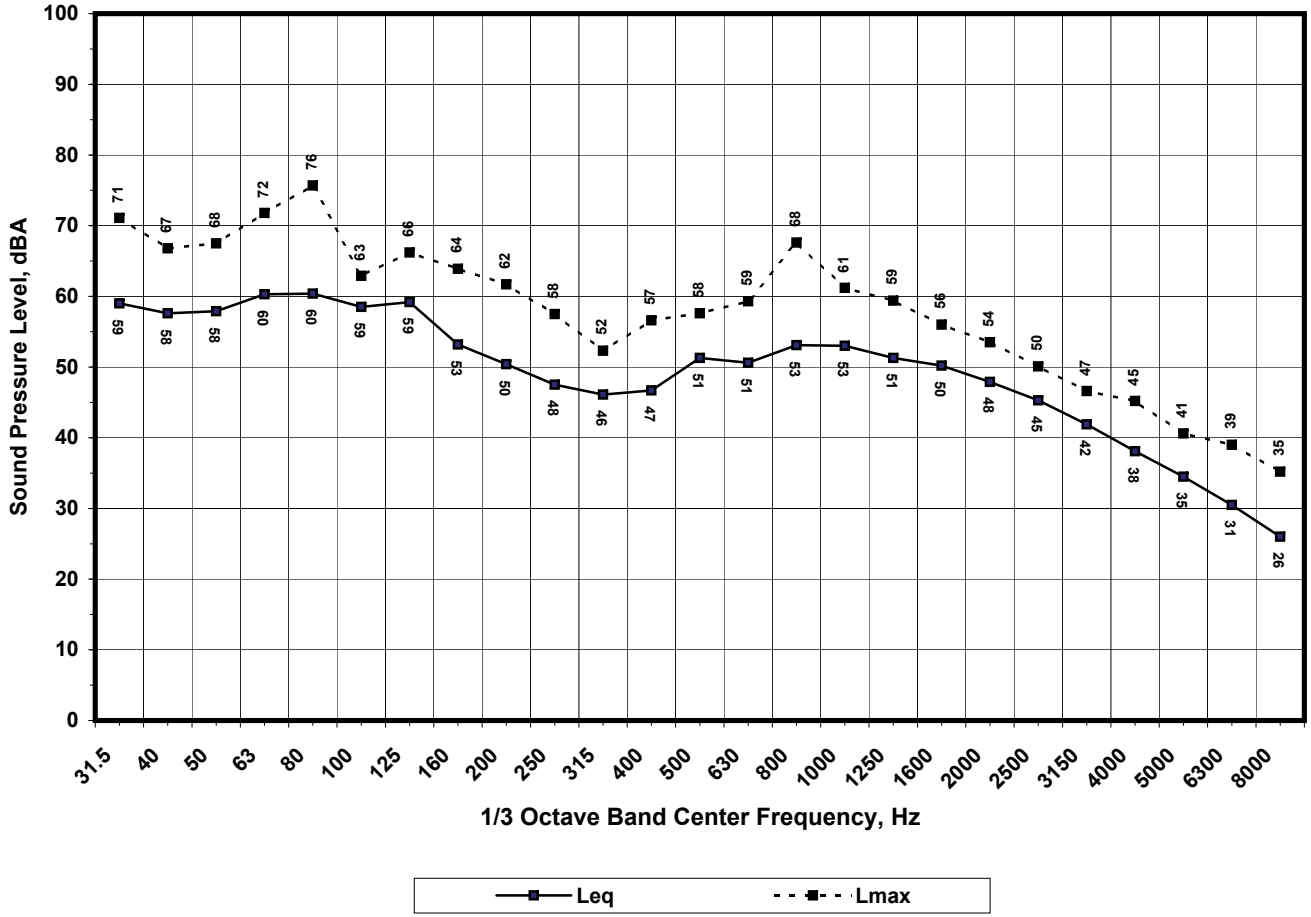
Project: 2017-112
Location: Site 5
Date: 1/8/2015
Time: 12:00 PM
SLM: 824-2

Calibrator: 200
Wind: Calm
Weather: 60F, Clear sky
Field Tech: WOO

Measurement Results, dBA

Duration: 10 minutes
L_{eq}: 60
L_{max}: 68
L_{min}: 45
L_{50}: 59
L_{90}: 53

Notes
Traffic from Hwy 113 is the dominant noise source.



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Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2017-112
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Anderson Road	North of Covell Boulevard	5,130	85		15	1	1	30	100	
2	Anderson Road	South of Covell Boulevard	8,360	85		15	1	1	30	100	
3	Covell Boulevard	East of Anderson Road	15,560	85		15	1	1	35	100	
4	Covell Boulevard	West of Anderson Road	16,670	85		15	1	1	35	100	
5	Covell Boulevard	East of Denali Drive	12,060	85		15	1	1	45	100	
6	Covell Boulevard	West of Denali Drive	10,190	85		15	1	1	45	100	
7	Covell Boulevard	East of F Street	21,280	85		15	1	1	35	100	
8	Covell Boulevard	West of F Street	18,830	85		15	1	1	35	100	
9	Covell Boulevard	East of Lake Boulevard	9,450	85		15	1	1	45	100	
10	Covell Boulevard	East of Oak Avenue	16,610	85		15	1	1	35	100	
11	Covell Boulevard	East of Sycamore Lane	16,980	85		15	1	1	35	100	
12	Covell Boulevard	West of J Street	21,280	85		15	1	1	35	100	
13	F Street	North of Covell Boulevard	6,960	85		15	1	1	30	100	
14	F Street	South of Covell Boulevard	9,730	85		15	1	1	25	100	
15	Lake Boulevard	North of Covell Boulevard	1,840	85		15	1	1	50	100	
16	Lake Boulevard	South of Covell Boulevard	5,670	85		15	1	1	30	100	
17	Risling Court	North of Covell Boulevard	1,250	85		15	1	1	25	100	
18	Risling Court	North of Sutter Hospital Driveway	880	85		15	1	1	25	100	
19	Risling Court	South of Sutter Hospital Driveway	1,250	85		15	1	1	25	100	
20	Sycamore Lane	North of Covell Boulevard	6,210	85		15	1	1	25	100	
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2017-112
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Anderson Road	North of Covell Boulevard	53.6	44.2	51.3	55.9
2	Anderson Road	South of Covell Boulevard	55.7	46.3	53.5	58.0
3	Covell Boulevard	East of Anderson Road	60.3	50.1	55.3	61.8
4	Covell Boulevard	West of Anderson Road	60.6	50.4	55.6	62.1
5	Covell Boulevard	East of Denali Drive	62.3	50.7	55.2	63.3
6	Covell Boulevard	West of Denali Drive	61.6	49.9	54.4	62.6
7	Covell Boulevard	East of F Street	61.7	51.4	56.6	63.2
8	Covell Boulevard	West of F Street	61.1	50.9	56.1	62.6
9	Covell Boulevard	East of Lake Boulevard	61.3	49.6	54.1	62.3
10	Covell Boulevard	East of Oak Avenue	60.6	50.4	55.6	62.1
11	Covell Boulevard	East of Sycamore Lane	60.7	50.5	55.7	62.2
12	Covell Boulevard	West of J Street	61.7	51.4	56.6	63.2
13	F Street	North of Covell Boulevard	54.9	45.5	52.7	57.2
14	F Street	South of Covell Boulevard	54.1	45.8	53.4	57.1
15	Lake Boulevard	North of Covell Boulevard	55.5	43.2	47.4	56.3
16	Lake Boulevard	South of Covell Boulevard	54.0	44.7	51.8	56.3
17	Risling Court	North of Covell Boulevard	45.1	36.8	44.5	48.2
18	Risling Court	North of Sutter Hospital Driveway	43.6	35.3	43.0	46.6
19	Risling Court	South of Sutter Hospital Driveway	45.1	36.8	44.5	48.2
20	Sycamore Lane	North of Covell Boulevard	52.1	43.8	51.4	55.1

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2017-112
Description: Existing Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Anderson Road	North of Covell Boulevard	5	11	25	53	115
2	Anderson Road	South of Covell Boulevard	7	16	34	74	159
3	Covell Boulevard	East of Anderson Road	13	28	61	132	284
4	Covell Boulevard	West of Anderson Road	14	30	64	138	297
5	Covell Boulevard	East of Denali Drive	17	36	78	167	360
6	Covell Boulevard	West of Denali Drive	15	32	69	149	322
7	Covell Boulevard	East of F Street	16	35	75	162	349
8	Covell Boulevard	West of F Street	15	32	69	150	322
9	Covell Boulevard	East of Lake Boulevard	14	31	66	142	306
10	Covell Boulevard	East of Oak Avenue	14	30	64	138	296
11	Covell Boulevard	East of Sycamore Lane	14	30	65	140	301
12	Covell Boulevard	West of J Street	16	35	75	162	349
13	F Street	North of Covell Boulevard	7	14	30	65	141
14	F Street	South of Covell Boulevard	6	14	30	64	138
15	Lake Boulevard	North of Covell Boulevard	6	12	26	57	123
16	Lake Boulevard	South of Covell Boulevard	6	12	26	57	123
17	Risling Court	North of Covell Boulevard	2	4	8	16	35
18	Risling Court	North of Sutter Hospital Driveway	1	3	6	13	28
19	Risling Court	South of Sutter Hospital Driveway	2	4	8	16	35
20	Sycamore Lane	North of Covell Boulevard	5	10	22	47	102

Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2017-112
Description: Existing + Approved Projects + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Anderson Road	North of Covell Boulevard	4,870	85		15	1	1	30	100	
2	Anderson Road	South of Covell Boulevard	8,700	85		15	1	1	30	100	
3	Covell Boulevard	East of Anderson Road	16,810	85		15	1	1	35	100	
4	Covell Boulevard	West of Anderson Road	18,080	85		15	1	1	35	100	
5	Covell Boulevard	East of Denali Drive	12,770	85		15	1	1	45	100	
6	Covell Boulevard	West of Denali Drive	10,700	85		15	1	1	45	100	
7	Covell Boulevard	East of F Street	22,620	85		15	1	1	35	100	
8	Covell Boulevard	West of F Street	20,410	85		15	1	1	35	100	
9	Covell Boulevard	East of Lake Boulevard	9,890	85		15	1	1	45	100	
10	Covell Boulevard	East of Oak Avenue	18,200	85		15	1	1	35	100	
11	Covell Boulevard	East of Sycamore Lane	18,290	85		15	1	1	35	100	
12	Covell Boulevard	West of J Street	22,720	85		15	1	1	35	100	
13	F Street	North of Covell Boulevard	7,040	85		15	1	1	30	100	
14	F Street	South of Covell Boulevard	10,730	85		15	1	1	25	100	
15	Lake Boulevard	North of Covell Boulevard	1,840	85		15	1	1	50	100	
16	Lake Boulevard	South of Covell Boulevard	5,930	85		15	1	1	30	100	
17	Project Driveway	North of Covell Boulevard	1,050	85		15	1	1	25	100	
18	Risling Court	North of Covell Boulevard	3,120	85		15	1	1	25	100	
19	Risling Court	North of Sutter Hospital Driveway	1,550	85		15	1	1	25	100	
20	Risling Court	South of Sutter Hospital Driveway	3,000	85		15	1	1	25	100	
21	Sutter Hospital Driveway	West of Risling Court	1,180	85		15	1	1	25	100	
22	Sycamore Lane	North of Covell Boulevard	6,780	85		15	1	1	25	100	
23											
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2017-112

Description: Existing + Approved Projects + Project

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Anderson Road	North of Covell Boulevard	53.3	44.0	51.1	55.7
2	Anderson Road	South of Covell Boulevard	55.8	46.5	53.6	58.2
3	Covell Boulevard	East of Anderson Road	60.6	50.4	55.6	62.1
4	Covell Boulevard	West of Anderson Road	61.0	50.7	55.9	62.4
5	Covell Boulevard	East of Denali Drive	62.6	50.9	55.4	63.6
6	Covell Boulevard	West of Denali Drive	61.8	50.2	54.7	62.8
7	Covell Boulevard	East of F Street	61.9	51.7	56.9	63.4
8	Covell Boulevard	West of F Street	61.5	51.3	56.5	63.0
9	Covell Boulevard	East of Lake Boulevard	61.5	49.8	54.3	62.5
10	Covell Boulevard	East of Oak Avenue	61.0	50.8	56.0	62.5
11	Covell Boulevard	East of Sycamore Lane	61.0	50.8	56.0	62.5
12	Covell Boulevard	West of J Street	61.9	51.7	56.9	63.4
13	F Street	North of Covell Boulevard	54.9	45.6	52.7	57.3
14	F Street	South of Covell Boulevard	54.5	46.2	53.8	57.5
15	Lake Boulevard	North of Covell Boulevard	55.5	43.2	47.4	56.3
16	Lake Boulevard	South of Covell Boulevard	54.2	44.8	52.0	56.5
17	Project Driveway	North of Covell Boulevard	44.4	36.1	43.7	47.4
18	Risling Court	North of Covell Boulevard	49.1	40.8	48.5	52.1
19	Risling Court	North of Sutter Hospital Driveway	46.1	37.8	45.4	49.1
20	Risling Court	South of Sutter Hospital Driveway	48.9	40.7	48.3	52.0
21	Sutter Hospital Driveway	West of Risling Court	44.9	36.6	44.2	47.9
22	Sycamore Lane	North of Covell Boulevard	52.5	44.2	51.8	55.5

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2017-112

Description: Existing + Approved Projects + Project

Ldn/CNEL: Ldn

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Anderson Road	North of Covell Boulevard	5	11	24	51	111
2	Anderson Road	South of Covell Boulevard	8	16	35	76	163
3	Covell Boulevard	East of Anderson Road	14	30	64	139	299
4	Covell Boulevard	West of Anderson Road	15	31	68	146	313
5	Covell Boulevard	East of Denali Drive	17	37	81	174	374
6	Covell Boulevard	West of Denali Drive	15	33	72	154	332
7	Covell Boulevard	East of F Street	17	36	78	169	364
8	Covell Boulevard	West of F Street	16	34	73	158	340
9	Covell Boulevard	East of Lake Boulevard	15	32	68	146	315
10	Covell Boulevard	East of Oak Avenue	15	31	68	146	315
11	Covell Boulevard	East of Sycamore Lane	15	32	68	147	316
12	Covell Boulevard	West of J Street	17	37	79	169	365
13	F Street	North of Covell Boulevard	7	14	31	66	142
14	F Street	South of Covell Boulevard	7	15	32	68	147
15	Lake Boulevard	North of Covell Boulevard	6	12	26	57	123
16	Lake Boulevard	South of Covell Boulevard	6	13	27	59	127
17	Project Driveway	North of Covell Boulevard	1	3	7	14	31
18	Risling Court	North of Covell Boulevard	3	6	14	30	64
19	Risling Court	North of Sutter Hospital Driveway	2	4	9	19	40
20	Risling Court	South of Sutter Hospital Driveway	3	6	14	29	63
21	Sutter Hospital Driveway	West of Risling Court	2	3	7	16	34
22	Sycamore Lane	North of Covell Boulevard	5	11	23	50	108

Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2017-112
Description: Cumulative No Project Traffic
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Anderson Road	North of Covell Boulevard	5,700	85		15	1	1	30	100	
2	Anderson Road	South of Covell Boulevard	12,200	85		15	1	1	30	100	
3	Covell Boulevard	East of Anderson Road	19,800	85		15	1	1	35	100	
4	Covell Boulevard	West of Anderson Road	21,900	85		15	1	1	35	100	
5	Covell Boulevard	East of Denali Drive	17,300	85		15	1	1	45	100	
6	Covell Boulevard	West of Denali Drive	14,300	85		15	1	1	45	100	
7	Covell Boulevard	East of F Street	29,400	85		15	1	1	35	100	
8	Covell Boulevard	West of F Street	25,200	85		15	1	1	35	100	
9	Covell Boulevard	East of Lake Boulevard	13,300	85		15	1	1	45	100	
10	Covell Boulevard	East of Oak Avenue	21,600	85		15	1	1	35	100	
11	Covell Boulevard	East of Sycamore Lane	23,000	85		15	1	1	35	100	
12	Covell Boulevard	West of J Street	29,200	85		15	1	1	35	100	
13	F Street	North of Covell Boulevard	8,300	85		15	1	1	30	100	
14	F Street	South of Covell Boulevard	11,100	85		15	1	1	25	100	
15	Lake Boulevard	North of Covell Boulevard	2,400	85		15	1	1	50	100	
16	Lake Boulevard	South of Covell Boulevard	8,900	85		15	1	1	30	100	
17	Risling Court	North of Covell Boulevard	3,700	85		15	1	1	25	100	
18	Risling Court	North of Sutter Hospital Driveway	1,600	85		15	1	1	25	100	
19	Risling Court	South of Sutter Hospital Driveway	3,700	85		15	1	1	25	100	
20	Sycamore Lane	North of Covell Boulevard	8,700	85		15	1	1	25	100	
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2017-112

Description: Cumulative No Project Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Anderson Road	North of Covell Boulevard	54.0	44.7	51.8	56.4
2	Anderson Road	South of Covell Boulevard	57.3	48.0	55.1	59.7
3	Covell Boulevard	East of Anderson Road	61.3	51.1	56.3	62.8
4	Covell Boulevard	West of Anderson Road	61.8	51.6	56.8	63.3
5	Covell Boulevard	East of Denali Drive	63.9	52.2	56.7	64.9
6	Covell Boulevard	West of Denali Drive	63.1	51.4	55.9	64.1
7	Covell Boulevard	East of F Street	63.1	52.8	58.0	64.6
8	Covell Boulevard	West of F Street	62.4	52.2	57.4	63.9
9	Covell Boulevard	East of Lake Boulevard	62.8	51.1	55.6	63.8
10	Covell Boulevard	East of Oak Avenue	61.7	51.5	56.7	63.2
11	Covell Boulevard	East of Sycamore Lane	62.0	51.8	57.0	63.5
12	Covell Boulevard	West of J Street	63.0	52.8	58.0	64.5
13	F Street	North of Covell Boulevard	55.6	46.3	53.4	58.0
14	F Street	South of Covell Boulevard	54.6	46.3	54.0	57.7
15	Lake Boulevard	North of Covell Boulevard	56.6	44.4	48.6	57.5
16	Lake Boulevard	South of Covell Boulevard	55.9	46.6	53.7	58.3
17	Risling Court	North of Covell Boulevard	49.9	41.6	49.2	52.9
18	Risling Court	North of Sutter Hospital Driveway	46.2	37.9	45.6	49.2
19	Risling Court	South of Sutter Hospital Driveway	49.9	41.6	49.2	52.9
20	Sycamore Lane	North of Covell Boulevard	53.6	45.3	52.9	56.6

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2017-112

Description: Cumulative No Project Traffic

Ldn/CNEL: Ldn

Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Anderson Road	North of Covell Boulevard	6	12	27	57	123
2	Anderson Road	South of Covell Boulevard	9	20	44	95	205
3	Covell Boulevard	East of Anderson Road	15	33	72	155	333
4	Covell Boulevard	West of Anderson Road	17	36	77	165	356
5	Covell Boulevard	East of Denali Drive	21	46	99	212	458
6	Covell Boulevard	West of Denali Drive	19	40	87	187	403
7	Covell Boulevard	East of F Street	20	43	93	201	434
8	Covell Boulevard	West of F Street	18	39	84	182	391
9	Covell Boulevard	East of Lake Boulevard	18	38	83	178	384
10	Covell Boulevard	East of Oak Avenue	16	35	76	164	353
11	Covell Boulevard	East of Sycamore Lane	17	37	79	171	368
12	Covell Boulevard	West of J Street	20	43	93	200	432
13	F Street	North of Covell Boulevard	7	16	34	73	158
14	F Street	South of Covell Boulevard	7	15	32	70	150
15	Lake Boulevard	North of Covell Boulevard	7	15	32	68	147
16	Lake Boulevard	South of Covell Boulevard	8	17	36	77	166
17	Risling Court	North of Covell Boulevard	3	7	16	34	72
18	Risling Court	North of Sutter Hospital Driveway	2	4	9	19	41
19	Risling Court	South of Sutter Hospital Driveway	3	7	16	34	72
20	Sycamore Lane	North of Covell Boulevard	6	13	28	59	128

Appendix B
FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2017-112
Description: Cumulative + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Anderson Road	North of Covell Boulevard	5,740	85		15	1	1	30	100	
2	Anderson Road	South of Covell Boulevard	12,330	85		15	1	1	30	100	
3	Covell Boulevard	East of Anderson Road	20,300	85		15	1	1	35	100	
4	Covell Boulevard	West of Anderson Road	22,570	85		15	1	1	35	100	
5	Covell Boulevard	East of Denali Drive	17,910	85		15	1	1	45	100	
6	Covell Boulevard	West of Denali Drive	14,750	85		15	1	1	45	100	
7	Covell Boulevard	East of F Street	29,610	85		15	1	1	35	100	
8	Covell Boulevard	West of F Street	25,530	85		15	1	1	35	100	
9	Covell Boulevard	East of Lake Boulevard	13,690	85		15	1	1	45	100	
10	Covell Boulevard	East of Oak Avenue	21,950	85		15	1	1	35	100	
11	Covell Boulevard	East of Sycamore Lane	23,670	85		15	1	1	35	100	
12	Covell Boulevard	West of J Street	29,410	85		15	1	1	35	100	
13	F Street	North of Covell Boulevard	8,300	85		15	1	1	30	100	
14	F Street	South of Covell Boulevard	11,220	85		15	1	1	25	100	
15	Lake Boulevard	North of Covell Boulevard	2,400	85		15	1	1	50	100	
16	Lake Boulevard	South of Covell Boulevard	9,190	85		15	1	1	30	100	
17	Project Driveway	North of Covell Boulevard	1,050	85		15	1	1	25	100	
18	Risling Court	North of Covell Boulevard	5,280	85		15	1	1	25	100	
19	Risling Court	North of Sutter Hospital Driveway	2,270	85		15	1	1	25	100	
20	Risling Court	South of Sutter Hospital Driveway	5,160	85		15	1	1	25	100	
21	Sutter Hospital Driveway	West of Risling Court	1,180	85		15	1	1	25	100	
22	Sycamore Lane	North of Covell Boulevard	8,730	85		15	1	1	25	100	
23											
24											
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Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Predicted Levels

Project #: 2017-112
Description: Cumulative + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	Autos	Medium Trucks	Heavy Trucks	Total
1	Anderson Road	North of Covell Boulevard	54.0	44.7	51.8	56.4
2	Anderson Road	South of Covell Boulevard	57.4	48.0	55.1	59.7
3	Covell Boulevard	East of Anderson Road	61.5	51.2	56.4	62.9
4	Covell Boulevard	West of Anderson Road	61.9	51.7	56.9	63.4
5	Covell Boulevard	East of Denali Drive	64.1	52.4	56.9	65.1
6	Covell Boulevard	West of Denali Drive	63.2	51.6	56.0	64.2
7	Covell Boulevard	East of F Street	63.1	52.9	58.1	64.6
8	Covell Boulevard	West of F Street	62.5	52.2	57.4	63.9
9	Covell Boulevard	East of Lake Boulevard	62.9	51.2	55.7	63.9
10	Covell Boulevard	East of Oak Avenue	61.8	51.6	56.8	63.3
11	Covell Boulevard	East of Sycamore Lane	62.1	51.9	57.1	63.6
12	Covell Boulevard	West of J Street	63.1	52.8	58.0	64.6
13	F Street	North of Covell Boulevard	55.6	46.3	53.4	58.0
14	F Street	South of Covell Boulevard	54.7	46.4	54.0	57.7
15	Lake Boulevard	North of Covell Boulevard	56.6	44.4	48.6	57.5
16	Lake Boulevard	South of Covell Boulevard	56.1	46.7	53.9	58.4
17	Project Driveway	North of Covell Boulevard	44.4	36.1	43.7	47.4
18	Risling Court	North of Covell Boulevard	51.4	43.1	50.7	54.4
19	Risling Court	North of Sutter Hospital Driveway	47.7	39.4	47.1	50.8
20	Risling Court	South of Sutter Hospital Driveway	51.3	43.0	50.6	54.3
21	Sutter Hospital Driveway	West of Risling Court	44.9	36.6	44.2	47.9
22	Sycamore Lane	North of Covell Boulevard	53.6	45.3	52.9	56.6

Appendix B

FHWA-RD-77-108 Highway Traffic Noise Prediction Model

Noise Contour Output

Project #: 2017-112
Description: Cumulative + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

			-------- Distances to Traffic Noise Contours --------				
Segment	Roadway Name	Segment Description	75	70	65	60	55
1	Anderson Road	North of Covell Boulevard	6	12	27	57	124
2	Anderson Road	South of Covell Boulevard	10	21	44	96	206
3	Covell Boulevard	East of Anderson Road	16	34	73	157	339
4	Covell Boulevard	West of Anderson Road	17	36	78	169	363
5	Covell Boulevard	East of Denali Drive	22	47	101	217	468
6	Covell Boulevard	West of Denali Drive	19	41	89	191	412
7	Covell Boulevard	East of F Street	20	44	94	202	436
8	Covell Boulevard	West of F Street	18	39	85	183	395
9	Covell Boulevard	East of Lake Boulevard	18	39	84	182	392
10	Covell Boulevard	East of Oak Avenue	17	36	77	166	357
11	Covell Boulevard	East of Sycamore Lane	17	38	81	174	375
12	Covell Boulevard	West of J Street	20	43	93	201	434
13	F Street	North of Covell Boulevard	7	16	34	73	158
14	F Street	South of Covell Boulevard	7	15	33	70	151
15	Lake Boulevard	North of Covell Boulevard	7	15	32	68	147
16	Lake Boulevard	South of Covell Boulevard	8	17	36	79	169
17	Project Driveway	North of Covell Boulevard	1	3	7	14	31
18	Risling Court	North of Covell Boulevard	4	9	20	42	92
19	Risling Court	North of Sutter Hospital Driveway	2	5	11	24	52
20	Risling Court	South of Sutter Hospital Driveway	4	9	19	42	90
21	Sutter Hospital Driveway	West of Risling Court	2	3	7	16	34
22	Sycamore Lane	North of Covell Boulevard	6	13	28	59	128