TECHNICAL APPENDIX

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT

TRANSPORTATION FACILITY RELOCATION PROJECT

MITIGATED NEGATIVE DECLARATION (MND)

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
5735 47th Avenue
Sacramento, CA 95824

April 3, 2018

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT

TRANSPORTATION FACILITY RELOCATION PROJECT

MITIGATED NEGATIVE DECLARATION (MND)

TECHNICAL APPENDIX

Prepared for:

SACRAMENTO CITY UNIFIED SCHOOL DISTRICT
5735 47th Avenue
Sacramento, CA 95824

Prepared by:

Planning Dynamics Group (PDG)

In association with:

Saxelby Acoustics, Noise Consultants
Air Quality Specialists, Air Quality Consultants

April 3, 2018

SCUSD TRANSPORTATION FACILITY RELOCATION PROJECT

Mitigated Negative Declaration (MND)

TECHNICAL APPENDIX

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SCUSD Transportation Facility

Sacramento Metropolitan AQMD, Summary Report

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Government Office Building	24.00	1000sqft	0.55	24,000.00	0
Unrefrigerated Warehouse-No Rail	24.00	1000sqft	0.55	24,000.00	0
Parking Lot	200.00	Space	1.80	80,000.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 3.5 **Precipitation Freq (Days)** 58

Climate Zone 6 **Operational Year** 2019

Utility Company Sacramento Municipal Utility District

CO2 Intensity (lb/MWhr) 590.31 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments

Only CalEEMod defaults were used.

Project Characteristics -

Land Use -

Construction Phase -

Road Dust -

Mobile Commute Mitigation -

Fleet Mix - 68% of parking spaces for school bus parking for worst case 70% of vehicle mix

2.0 Peak Daily Emissions

Peak Daily Construction Emissions

Peak Daily Construction Emissions

		Unmitigated						Mitigated					
		ROG	NOX	CO	SO2	PM10	PM2.5	ROG	NOX	CO	SO2	PM10	PM2.5
Year	Phase	lb/day											
2018	Demolition	2.5508 S	24.4111 W	15.6335 S	0.0252 S	1.5361 S	1.3698 S	2.5508 S	24.4111 W	15.6335 S	0.0252 S	1.5361 S	1.3698 S
2018	Site Preparation	1.9407 S	23.6490 W	13.0677 S	0.0252 S	2.6061 S	1.0660 S	1.9407 S	23.6490 W	13.0677 S	0.0252 S	2.6061 S	1.0660 S
2018	Grading	2.2030 S	24.3256 W	10.7825 S	0.0215 S	7.7973 S	4.4630 S	2.2030 S	24.3256 W	10.7825 S	0.0215 S	7.7973 S	4.4630 S
2018	Building Construction	3.2883 S	23.6209 W	18.6363 S	0.0347 S	1.7965 W	1.3679 W	3.2883 S	23.6209 W	18.6363 S	0.0347 S	1.7965 W	1.3679 W
2019	Building Construction	2.8964 S	21.6494 W	17.8470 S	0.0345 S	1.6259 W	1.2046 W	2.8964 S	21.6494 W	17.8470 S	0.0345 S	1.6259 W	1.2046 W
2019	Paving	1.7872 S	12.6162 W	12.3923 S	0.0191 S	0.8450 S	0.7038 S	1.7872 S	12.6162 W	12.3923 S	0.0191 S	0.8450 S	0.7038 S
2019	Architectural Coating	44.8093 S	1.8672 W	2.2024 S	3.7900e-003 S	0.2054 S	0.1494 S	44.8093 S	1.8672 W	2.2024 S	3.7900e-003 S	0.2054 S	0.1494 S
	Peak Daily Total	44.8093 S	24.4111 W	18.6363 S	0.0347 S	7.7973 S	4.4630 S	44.8093 S	24.4111 W	18.6363 S	0.0347 S	7.7973 S	4.4630 S
	Air District Threshold												
	Exceed Significance?												

Peak Daily Operational Emissions

Peak Daily Operational Emissions

		Unmitigated						Mitigated					
		ROG	NOX	CO	SO2	PM10	PM2.5	ROG	NOX	CO	SO2	PM10	PM2.5
	Operational Activity	lb/day											
On-Site	Area	1.1799 S	2.4000e-004 S	0.0256 S	0.0000 S	9.0000e-005 S	9.0000e-005 S	1.1799 S	2.4000e-004 S	0.0256 S	0.0000 S	9.0000e-005 S	9.0000e-005 S
On-Site	Energy	9.6900e-003 S	0.0881 S	0.0740 S	5.3000e-004 S	6.6900e-003 S	6.6900e-003 S	9.6900e-003 S	0.0881 S	0.0740 S	5.3000e-004 S	6.6900e-003 S	6.6900e-003 S
Off-Site	Mobile	3.8246 S	11.2288 W	30.7572 S	0.0722 S	5.3861 W	1.4997 W	3.8246 S	11.2288 W	30.7572 S	0.0722 S	5.3861 W	1.4997 W
	Peak Daily Total	5.0142 S	11.3171 W	30.8568 S	0.0728 S	5.3929 W	1.5064 W	5.0142 S	11.3171 W	30.8568 S	0.0728 S	5.3929 W	1.5064 W
	Air District Threshold												
	Exceed Significance?												

3.0 Annual GHG Emissions

Annual GHG

Annual GHG

		Unmitigated				Mitigated			
		CO2	CH4	N2O	CO2e	CO2	CH4	N2O	CO2e
GHG Activity	Year	MT/yr							
Construction	2018	321.6206	0.0571	0.0000	323.0476	321.6203	0.0571	0.0000	323.0473
Construction	2019	46.7858	8.5729e-003	0.0000	47.0002	46.7858	8.5729e-003	0.0000	47.0001
Operational	2019	991.9027	0.6074	9.7976e-003	1,010.0066	991.9027	0.6074	9.7976e-003	1,010.0066
	Total								
	Significance Threshold								
	Exceed Significance?								

APPENDIX B: CO EXPOSURE ANALYSIS TECHNICAL MEMO

EPS
ENVIRONMENTAL PERMITTING SPECIALISTS
Air Quality • Permitting • OHSA • RMP/PSM

DRAFT TECHNICAL MEMORANDUM

To: James Dobson
Facilities Director
Sacramento Unified School District

Date: March 07, 2018

From: Ray Kapahi RK
Tel: 916-687-8352
Tel: 916-687-8352
E-Mail: ray.kapahi@gmail.com

Subject: Evaluation of Carbon Monoxide Emissions from School Bus Idling from New Transportation Facility

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INTRODUCTION

Environmental Permitting Specialists has been retained by Sacramento City Unified School District (SCUSD) to evaluate air quality impacts associated with carbon monoxide (CO) emissions from idling of school buses from the proposed transportation facility. The proposed transportation facility is located across from the current transportation facility at 3101 Redding Avenue (Figure 1). The new transportation facility would not generate any new emissions. Rather, existing emissions from the old facility will be shifted to the new facility.

SCUSD maintains a fleet of diesel, compressed natural gas (CNG) and gasoline fueled school buses. The vast majority of the buses, however, are diesel. The District's current inventory includes 177 buses. Majority (75%) of these buses are Type "A" 20 passenger vehicles powered by diesel engines. The remaining buses are type "C" or "D". These are the full size 60+ passenger vehicles (See Figure 2). Typically, 100 school buses are in use on a typical school day.

The objective of this evaluation is to determine if CO emissions from the school buses are likely to cause significant air quality impacts to homes near the proposed transportation facility. Current state and federal air quality regulations have established 1-hour and 8-hour standards. Air quality impacts are considered significant if emissions from a project leads to local concentrations of COabove these standards. The standards are summarized on the next page.

Summary of State and Federal CO Air Quality Standards		
Averaging Time	State	Federal
1-Hour	20 ppm (23,000 ug/m3)	35 ppm (40,000 ug/m3)
8-Hour	9 ppm (10,000 ug/m3)	9 ppm (10,000 ug/m3)

ppm – parts per million
ug/m3 – micrograms per cubic meter

The majority of the CO emissions from the school buses occur off-site when students are being transported to various schools and therefore, do not impact nearby homes. However, prior to leaving the transportation facility in the morning, the bus drivers perform various safety checks. During these safety checks, the buses are idling for 5 to 10 minutes before departing to various bus routes. In addition, there would be a small amount of emissions from the movement of buses in the yard. The CO emissions during idling can potentially impact nearby homes as they would occur at the new transportation facility that is surrounded by homes.

To evaluate the significance of CO emissions on local air quality, a three-step procedure was used:

1. Calculate the emission rates (e.g., lbs/hr or grams/sec) of CO during idling
2. Determine CO concentration (e.g., ug/m3 or ppm) associated with these emissions
3. Compare CO concentrations with state and federal standards

ESTIMATE OF CARBON MONOXIDE EMISSIONS

Emissions of carbon monoxide during bus idling were based on data published by the California Air Resources Board (CARB). The published data summarizes emissions of various pollutants for school buses by air district and calendar year. An excerpt of the CARB data is shown below.

1	CY	EMFAC20	Fuel_	air_basin	season	HC (g/hr-ve	CO (g/hr-veh)	NOX (g
5198	2018	SBUS	D	NEP	a	0.88178937	11.89631004	92.95401
5199	2018	SBUS	D	NEP	s	0.831003719	8.6443488	95.94414
5200	2018	SBUS	D	NEP	w	0.951921936	16.38711365	88.82478
5201	2018	SBUS	D	SC	a	0.88178937	11.89631004	92.95401
5202	2018	SBUS	D	SC	s	0.831003719	8.6443488	95.94414
5203	2018	SBUS	D	SC	w	0.951921936	16.38711365	88.82478
5204	2018	SBUS	D	SCC	a	0.88178937	11.89631004	92.95401

This data shows that CO emissions from bus idling are 11.9 grams per hour or 1.98 grams per hour for 10 minutes per bus. These emissions are for the full size (Type “C” or “D”) school buses. Emissions for Type “A” would be lower based on their engine horsepower. Emissions from CNG and gasoline buses were assumed to be similar as diesel fueled buses based on review of published data. In some cases, the CNG fueled emissions are slightly lower than those from diesel buses. To account for emissions during bus movement in the yard, the overall CO emissions were increased by 20%. See Table 1 for detailed calculations of CO emissions.

ESTIMATE OF CONCENTRATION OF CARBON MONOXIDE

In order to translate the emission rates into concentration, an air dispersion model was used. The recommended dispersion model is EPA's AERMOD model. This model takes into account the local wind data, topography, location of emission sources and location of nearby receptors. For this project, five years (2009 to 2013) of hourly wind data from Sacramento Metropolitan Airport were used to calculate the maximum 1-hour and 8-hour CO concentrations. Additional details used in running AERMOD are provided in Table 2.

The results of the dispersion model are shown in Figures 3 to 6 and discussed below.

1-Hour CO Concentrations

The results show that maximum 1-hour concentration varies from 20.2 ug/m3 to less than 3.0 ug/m3. The highest CO concentration impact (20.2 ug/m3) occur south of the new transportation facility (Figure 4).

8-Hour CO Concentrations

The results show that maximum 8-hour concentration varies from 2.5 ug/m3 to less than 0.6 ug/m3. The highest CO concentration impact (2.5 ug/m3) occur south of the new transportation facility (Figure 6).

SIGNIFICANCE OF CO EMISSIONS ON LOCAL AIR QUALITY

The results of the modeling show that emissions of CO from bus idling would contribute a maximum of 20.2 ug/m3 (1-hour) or 2.5 ug/m3 (8-hour). These impacts are compared with the most stringent current standards below:

Comparison of Project Impacts with Air Quality Standards		
Averaging Time	Project Impact	Current Standard
1-Hour	20.2 ug/m3	23,000 ug/m3
8-Hour	2.5 ug/m3	10,000 ug/m3

A comparison of project impacts to the Air Quality Standards indicate that emissions of CO from bus idling are well below the current standards and therefore are not a significant impact on nearby homes or prevailing air quality. Since the Sacramento area has been classified as "Attainment" for CO air quality standards, the cumulative project impacts (project + existing) are also not considered significant. As noted above, the proposed project does not increase cumulative CO emissions in that the project moves the buses (and related emissions) from north side of San Joaquin Street to the south side of San Joaquin Street.

REFERENCES

CARB (2013) EMFAC 2011 Technical Documentation. Available at: https://www.arb.ca.gov/msei/emfac2011-documentation-final.pdf

Donaldson (2016) Exhaust Product Guide for Medium and Heavy Duty Vehicles and Equipment. Available at: https://www.donaldson.com/content/dam/donaldson/engine-hydraulics-bulk/catalogs/Exhaust/North-America/F110028-ENG/Exhaust-Product-Guide.pdf

EPA (2016) AERMOD Modeling System Implementation Guide. Available at: https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod

Figures

Figure 1

Location of New Transportation Facility

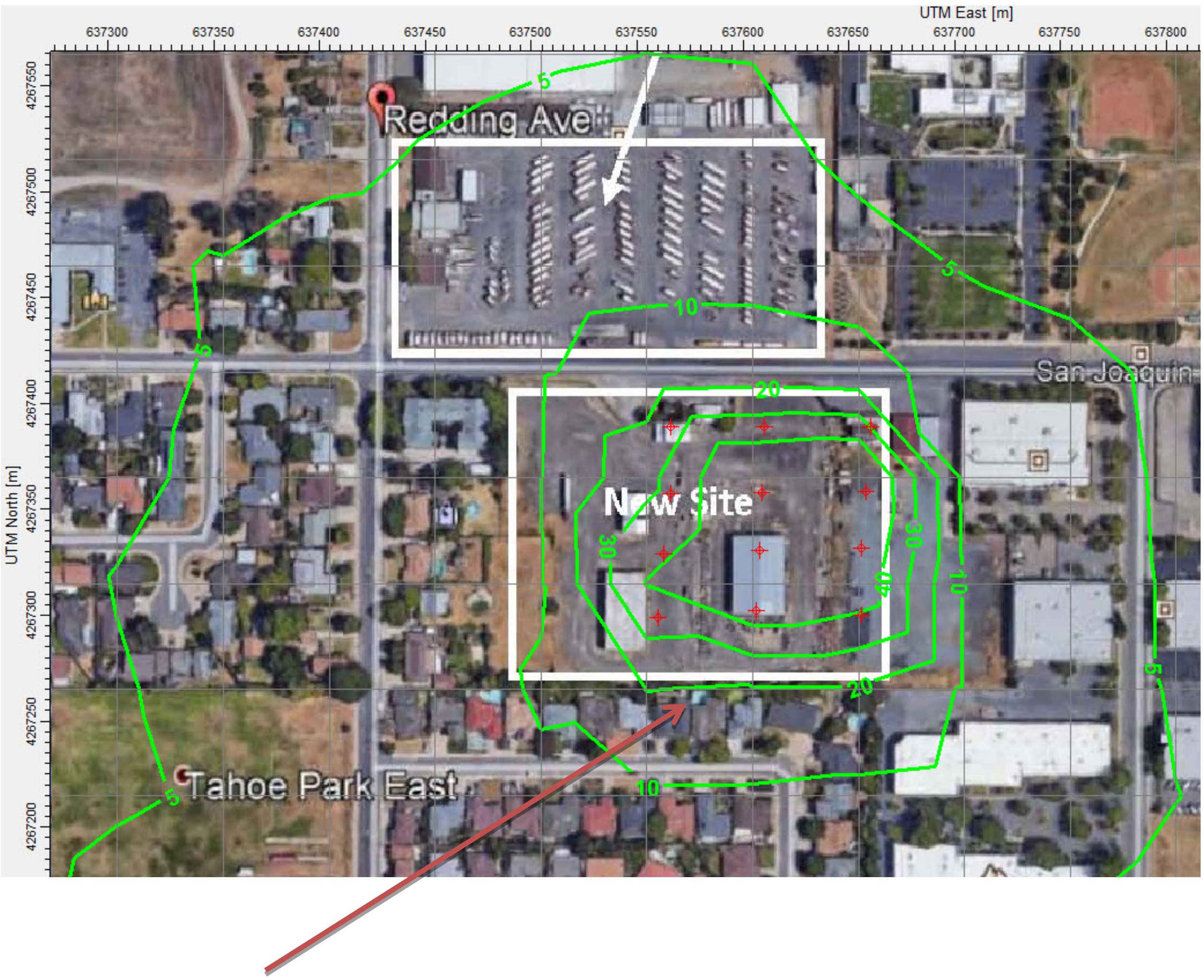
Figure 2
Types of School Buses

Type A

Type C

Type D

Figure 3
Spatial Variation of 1-Hour CO Concentration



Location of Maximum Concentration

Figure 4
1-Hour CO Concentration

Location of Maximum
Concentration

Figure 5
Spatial Variation of 8-Hour CO Concentration

Location of Maximum
Concentration

Figure 6
8-Hour CO Concentration

Location of Maximum Concentration

Tables

Table 1
Calculation of Carbon Monoxide Emissions from Idling of Diesel Fuelled Buses

		Large School Bus	Small School Bus
	Units	**(Max. 91 Passengers)**	**(Max. 36 Passengers)**
Vehicle Count		20	75
Engine HP	*HP*	350	250
Emission Factor for Vehicle Idling (Note 1)	*(grams/hr)*	11.9	8.5
Idle Time [per bus]	*(min)*	10	10
	(hrs)	0.17	0.17
Emissions [per bus]			
From Idling	*(grams)*	1.98	1.42
From Vehicle Movement [20% of Idle]	*(grams)*	0.397	0.283
Total per bus	*(grams)*	2.38	1.70
Emissions [All Buses]	*(grams)*	47.60	127.50
Emission Rate			
Over 1 hour	*(grams/hr)*	47.60	127.50
	(grams/sec)	1.32E-02	3.54E-02
Over 8 hours	*(grams/hr)*	5.95	15.94
	(grams/sec)	1.65E-03	4.43E-03

Table 2

Details of Dispersion Modeling of CO Emissions

Parameter	Value	Comments
Dispersion Model	AERMOD Version 16216	This is the recommended model for the EPA and ARB for simulating dispersion from stationary sources located over a fixed area
Urban or Rural Mode	Urban	
Regulatory Default Option	Option Used	
Terrain Adjustment	Option Used	
Meteorological Data	Most Recent 5 Years of hourly data from Sacramento Metropolitan Airport	
Pollutant Averaging Time(s)	1 hour 8 hours	These averaging times correspond with Ambient Air Quality Standards for CO
Grid Size and Spacing	2 km x 2 km 30 meter spacing	A total of
Source Geometry	The buses would be modeled as 12 individual point sources distributed about the parking area	The total emission rate of CO from all 100 buses will be modeled as 12 discrete point sources distributed over the parking lot
Release Height	3 feet	
Stack Diameter	4 inch	
Exhaust Flow Rate/Temperature	Based on engine size	Estimated using exhaust flow guidelines for Caterpillar and Cummins diesel engines

APPENDIX C: NOISE STUDY

SCUSD Transportation Facility Relocation

City of Sacramento, California

February 28, 2018

Project # 180203

Prepared for:

Sacramento City Unified School District
5735 47th Avenue
Sacramento, CA 95824

Prepared by:

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INTRODUCTION

The Sacramento City Unified School District (SCUSD) Transportation Facility Relocation project consists of the relocation of the existing transportation parking, repair, and administrative facilities from their current location on the north side of San Joaquin Street to a new parcel located immediately south of the existing facility location. The project also includes the construction of a new 15,000 s.f. warehouse to be located at the northeast corner of the existing SCUSD transportation facility parcel. The new project site is located on the south side of San Joaquin Street, approximately 200 feet east of the intersection with Redding Avenue in the City of Sacramento, California.

Figure 1 shows the project site plan. **Figure 2** shows an aerial photo of the project site.

ENVIRONMENTAL SETTING

BACKGROUND INFORMATION ON NOISE

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.

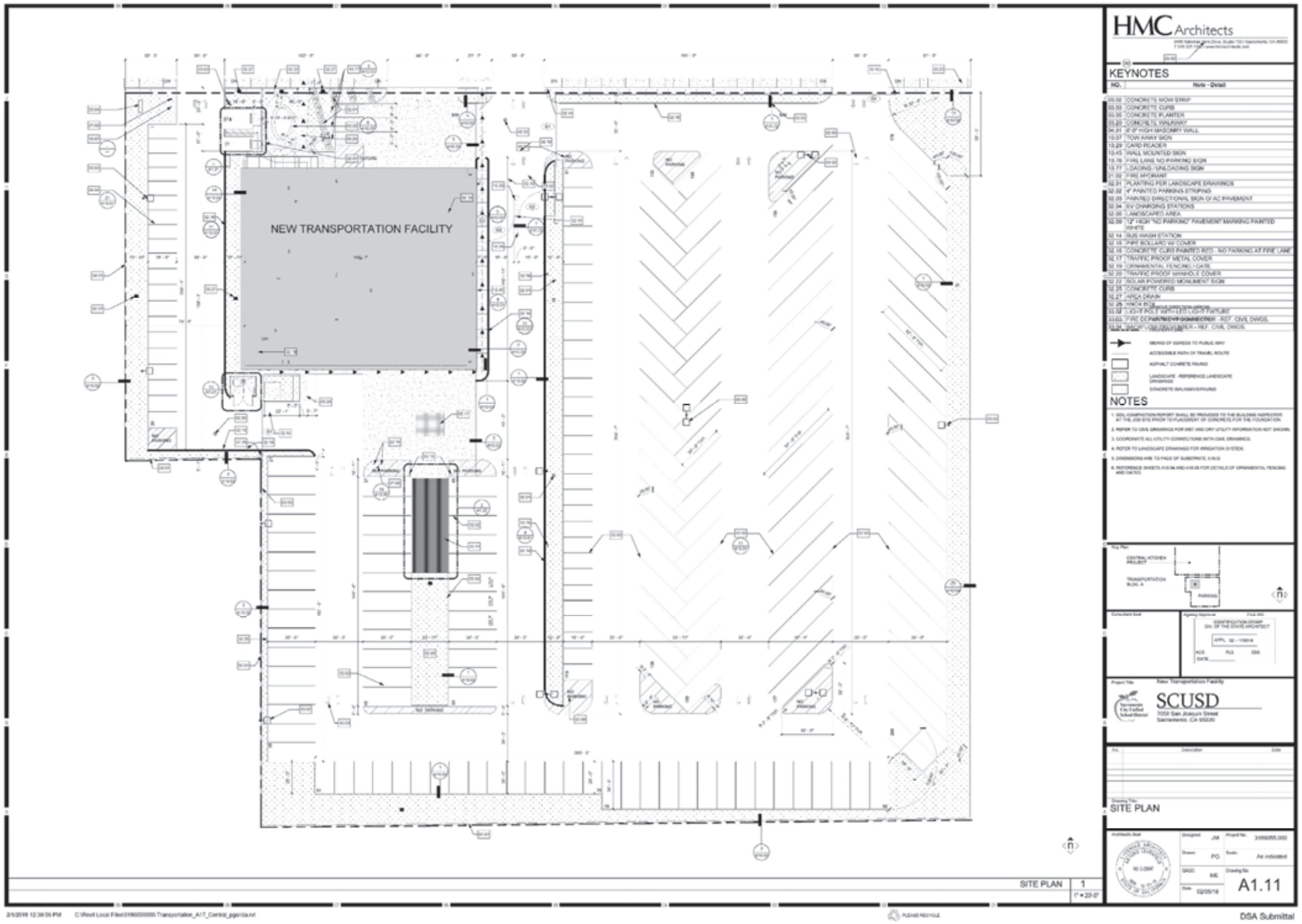
The perceived loudness of sounds is dependent upon many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by A-weighted sound levels. There is a strong 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.

SCUSD New Transportation Facility

City of Sacramento, California

Figure 1

Project Site Plan



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SCUSD New Transportation Facility

City of Sacramento, California

Figure 2: Project Site and Noise Measurement Locations

Legend

- Existing Transportation Facility
- PARCELS
- Project Site
- Sound Wall

0 m 50 m 100 m

Projection: State Plane (California Zone 2) / NAD83 / meters
Rev. Date: 02/27/2018

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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 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 (DNL or 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.

Table 1 lists several examples of the noise levels associated with common situations. **Appendix A** provides a summary of acoustical terms used in this report.

TABLE 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. September, 2013.

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
- 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 AND FUTURE NOISE AND VIBRATION ENVIRONMENTS

EXISTING NOISE RECEPTORS

Some land uses are considered more sensitive to noise than others. Land uses often associated with sensitive receptors generally include residences, schools, libraries, hospitals, and passive recreational areas. Sensitive noise receptors may also include threatened or endangered noise sensitive biological species, although many jurisdictions have not adopted noise standards for wildlife areas. Noise sensitive land uses are typically given special attention in order to achieve protection from excessive noise.

Sensitivity is a function of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities involved. In the vicinity of the project site, sensitive land uses include existing multi-family and single-family residential uses located along the west and south sides of the proposed relocated transportation facility. Existing multi-family uses are also located north of the proposed 15,000 s.f. warehouse.

EXISTING GENERAL AMBIENT NOISE LEVELS

The existing noise environment in the project area is defined primarily by existing SCUSD transportation facilities, existing industrial uses in the project vicinity, and traffic noise from U.S. Highway 50 located approximately ½ mile to the north. Existing freight train activity is also audible at times from the existing rail line located approximately 900 feet to the east of the project site.

To quantify the existing ambient noise environment in the project vicinity, Saxelby Acoustics conducted continuous (24-hr.) noise level measurements at two locations on the existing transportation facility site and one location on the new proposed transportation facility site.

Noise measurement locations are shown on **Figure 2**. A summary of the noise level measurement survey results are provided in **Table 2**. **Appendix B** contains the complete results of the noise monitoring.

The sound level meters were programmed to record the maximum, median, and average noise levels at each site during the survey. The maximum value, denoted L_{max}, represents the highest noise level measured. The average value, denoted L_{eq}, represents the energy average of all the noise received by the sound level meter microphone during the monitoring period. The median value, denoted L_{50}, represents the sound level exceeded 50 percent of the time during the monitoring period.

Larson Davis Laboratories (LDL) Model 812 and 831 precision integrating sound level meters were used for the ambient noise level measurement survey. The meters were calibrated before and after use with a B&K Model 4230 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4).

TABLE 2: SUMMARY OF EXISTING BACKGROUND NOISE MEASUREMENT DATA

Site	Date	Average Measured Hourly Noise Levels, dBA						
			Daytime (7:00 am - 10:00 pm)			Nighttime (10:00 pm – 7:00 am)		
		L_{dn}	L_{eq}	L_{50}	L_{max}	L_{eq}	L_{50}	L_{max}
LT-1 (on-site near fueling canopy)	Feb 13-14, 2018	72	63	57	83	66	60	73
LT-2 (on-site near northeast corner of bus parking lot)	Feb 13-14, 2018	64	57	52	75	58	53	68
LT-3 (adjacent to existing residences at the south boundary of the new proposed transportation facility site)	Feb 13-14, 2018	61	52	50	65	55	51	65
Source: Saxelby Acoustics – 2018								

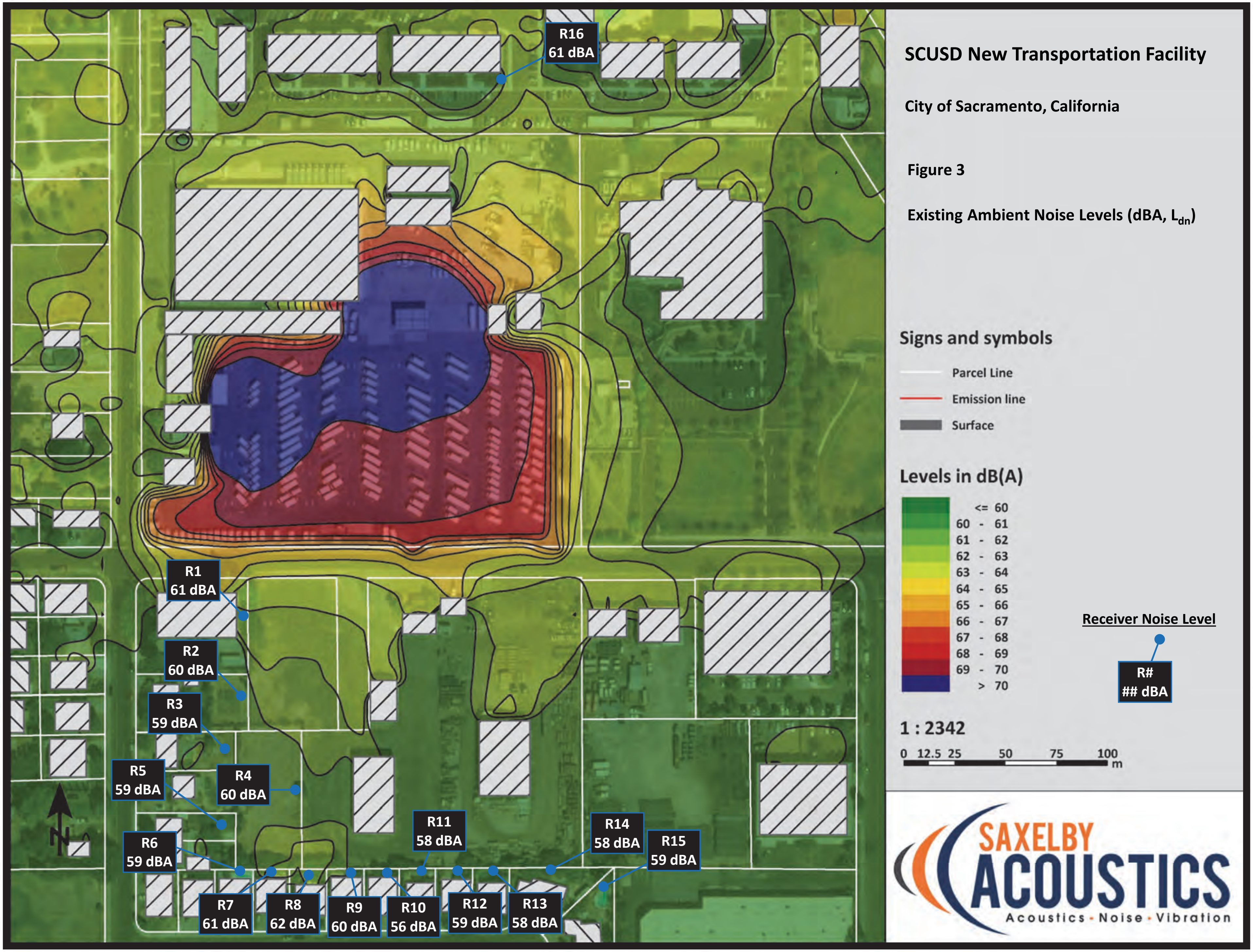
EVALUATION OF EXISTING AMBIENT NOISE

On-Site Noise Prediction Methodology

The existing noise levels measured at sites LT-1 and LT-2, along with existing traffic counts for U.S. Highway 50 were used to calculate existing ambient noise levels at each of the nearby residential receptors. This was done using the SoundPLAN noise prediction model with existing buildings, existing SCUSD facility locations, and other existing site features as input data. The SoundPLAN model was found to accurately predict noise levels to within 1 dBA of measured levels at all measurement sites.

It should be noted that the existing bus repair facilities were measured to generate noise levels of 68 dBA L_{eq}, 58 dBA L_{50}, and 76 dBA L_{max} at a distance of 120 feet from the open shop doors during a busy period of normal operations. This data was also input into the SoundPLAN model.

Existing ambient noise levels are shown on **Figure 3**.



SCUSD New Transportation Facility

City of Sacramento, California

Figure 3

Existing Ambient Noise Levels (dBA, L_{dn})

EVALUATION OF EXISTING PLUS PROJECT NOISE LEVELS

In order to evaluate the existing plus project exterior noise levels around the project site, Saxelby Acoustics re-ran the SoundPLAN model to include the new locations of the transportation facilities operating at the same sound power output as calculated based on existing conditions. New facilities located on the new project site include bus parking facilities and the bus repair shop. The existing fuel canopy was assumed to remain in its current location.

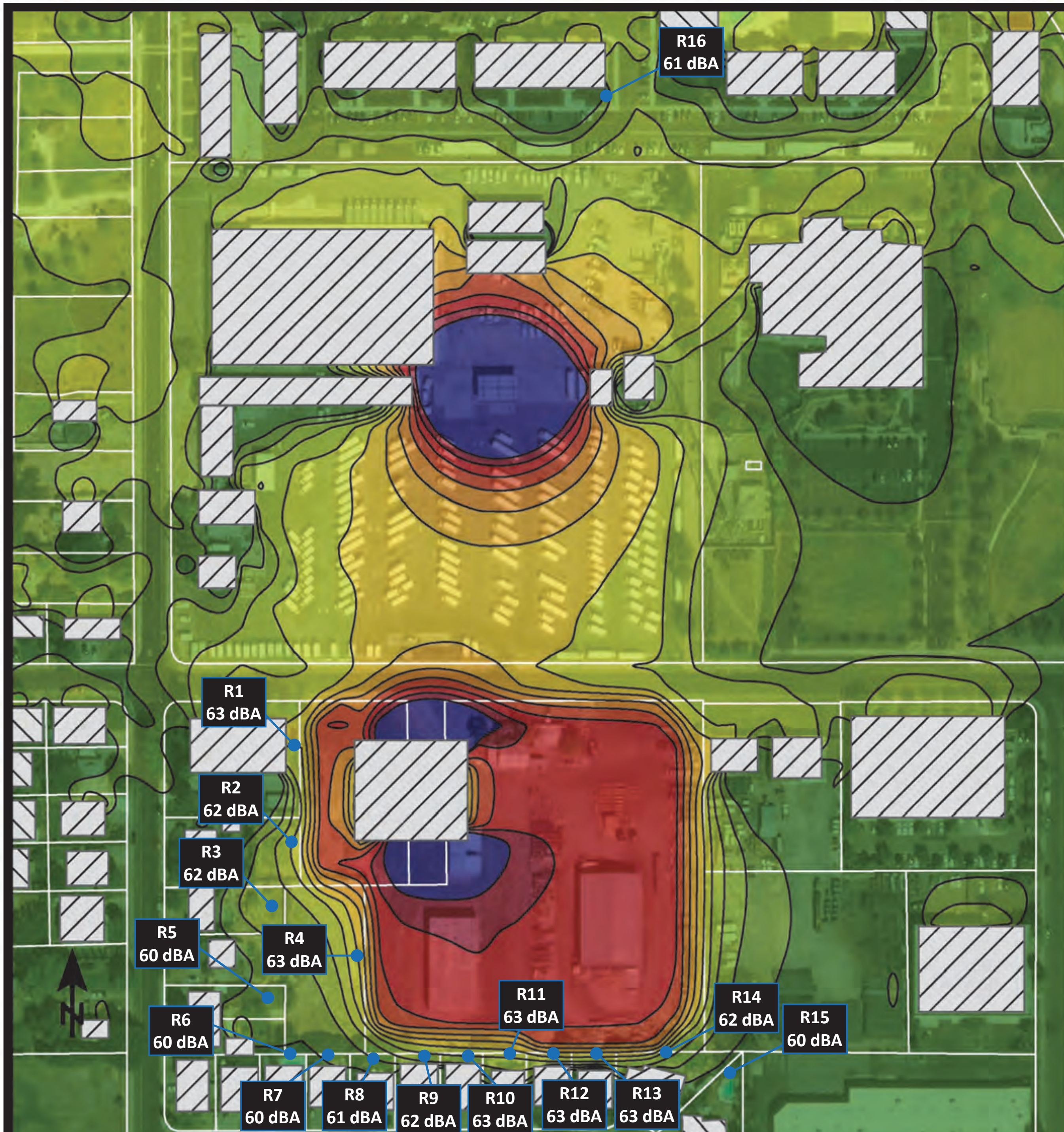
The results of this analysis are shown graphically on **Figure 4**.

Table 3 shows the predicted noise levels at the existing residential receptors versus the City of Sacramento General Plan Noise Standards.

TABLE 3: PREDICTED NOISE LEVELS AT SENSITIVE RECEPTORS AROUND PROJECT SITE

Receiver [1]	Existing Ambient Noise, dBA L_{dn}	Existing + Project Noise, dBA L_{dn}	Change	Existing Ambient Noise, dBA L_{50}	Existing + Project Noise, dBA L_{50}	Change	Existing Ambient Noise, dBA L_{max}	Existing + Project Noise, dBA L_{max}	Change
R1	61	63	+2	60	62	+2	72	77	+5
R2	60	62	+2	58	61	+3	68	76	+8
R3	59	62	+3	58	60	+2	68	73	+5
R4	60	63	+3	58	62	+4	68	78	+10
R5	59	60	+1	58	59	+1	68	71	+3
R6	59	60	+1	58	59	+1	68	70	+2
R7	61	60	-1	60	59	-1	70	71	+1
R8	62	61	-1	60	60	0	70	74	+3
R9	60	62	+2	59	61	+2	69	77	+8
R10	56	63	+7	55	61	+6	66	77	+11
R11	58	63	+5	57	61	+4	67	77	+10
R12	59	63	+4	58	62	+4	68	78	+10
R13	58	63	+5	57	62	+5	67	78	+11
R14	58	62	+4	57	61	+4	67	77	+10
R15	59	60	+1	58	59	+1	69	70	+1
R16	61	61	0	60	59	-1	74	69	+5

As shown in **Table 3,** the proposed project is predicted to result in noise level increases of up to 11 dBA versus existing ambient noise levels. **Figure 4** shows the predicted existing plus project noise levels in terms of the day/night average (L_{dn}) metric.



SCUSD New Transportation Facility

City of Sacramento, California

Figure 4

Existing Plus Project Noise Levels (dBA, L_{dn})

Signs and symbols

Parcel Line

Emission line

Surface

Level tables

Levels in dB(A)

<= 60
60 - 61
61 - 62
62 - 63
63 - 64
64 - 65
65 - 66
66 - 67
67 - 68
68 - 69
69 - 70
> 70

Receiver Noise Level

R#
dBA

1 : 2342

0 12.5 25 50 75 100 m

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Construction Noise Environment

During the construction of the proposed project, noise from construction activities would temporarily add to the noise environment in the project vicinity. As shown in **Table 4**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dB at a distance of 50 feet.

TABLE 4: CONSTRUCTION EQUIPMENT NOISE

Type of Equipment	Maximum Level, dBA at 50 feet
Auger Drill Rig	84
Backhoe	78
Compactor	83
Compressor (air)	78
Concrete Saw	90
Dozer	82
Dump Truck	76
Excavator	81
Generator	81
Jackhammer	89
Paver	77
Pneumatic Tools	85

Source: *Roadway Construction Noise Model User's Guide*. Federal Highway Administration. FHWA-HEP-05-054. January 2006.

Construction Vibration Environment

The primary vibration-generating activities associated with the proposed project would occur during construction when activities such as grading, utilities placement, and parking lot construction occur. **Table 5** shows the typical vibration levels produced by construction equipment.

TABLE 5: VIBRATION LEVELS FOR VARIOUS CONSTRUCTION EQUIPMENT

Type of Equipment	Peak Particle Velocity at 25 feet (inches/second)	Peak Particle Velocity at 50 feet (inches/second)	Peak Particle Velocity at 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 (Less than 0.20 at 26 feet)	0.074	0.026

Source: *Transit Noise and Vibration Impact Assessment Guidelines.* Federal Transit Administration. May 2006.

REGULATORY CONTEXT

FEDERAL

There are no federal regulations related to noise that apply to the Proposed Project.

STATE

There are no state regulations related to noise that apply to the Proposed Project.

LOCAL

City of Sacramento General Plan

The Noise Element of the City's General Plan identifies noise and land use compatibility standards for various land uses. The City's goal is to "minimize noise impacts on human activity to ensure the health and safety of the community."

Noise and vibration policy EC-3.1.1 establishes exterior noise level standards for multi-family and single-family residences. Table EC-1 (**Figure 5**) shows the City's land use compatibility standards.

Table EC 1 Exterior Noise Compatibility Standards for Various Land Uses	
Land Use Type	**Highest Level of Noise Exposure That Is Regarded as "Normally Acceptable"[a] (L_{dn}[b] or CNEL[c])**
Residential—Low Density Single Family, Duplex, Mobile Homes	60 dBA[d,e]
Residential—Multi-family	65 dBA
Urban Residential Infill[f] and Mixed-Use Projects[g]	70 dBA
Transient Lodging—Motels, Hotels	65 dBA
Schools, Libraries, Churches, Hospitals, Nursing Homes	70 dBA
Auditoriums, Concert Halls, Amphitheaters	Mitigation based on site-specific study
Sports Arena, Outdoor Spectator Sports	Mitigation based on site-specific study
Playgrounds, Neighborhood Parks	70 dBA
Golf Courses, Riding Stables, Water Recreation, Cemeteries	75 dBA
Office Buildings—Business, Commercial and Professional	70 dBA
Industrial, Manufacturing, Utilities, Agriculture	75 dBA

SOURCE: Governor's Office of Planning and Research, *State of California General Plan Guidelines 2003*, October 2003

a. As defined in the *Guidelines*, "Normally Acceptable" means that the "specified land use is satisfactory, based upon the assumption that any building involved is of normal conventional construction, without any special noise insulation requirements."

b. L_{dn} or Day Night Average Level is an average 24-hour noise measurement that factors in day and night noise levels.

c. CNEL or Community Noise Equivalent Level measurements are a weighted average of sound levels gathered throughout a 24-hour period.

d. dBA or A-weighted decibel scale is a measurement of noise levels.

e. The exterior noise standard for the residential area west of McClellan Airport known as McClellan Heights/Parker Homes is 65 dBA.

f. With land use designations of Central Business District, Urban Neighborhood (Low, Medium, or High) Urban Center (Low or High), Urban Corridor (Low or High).

g. All mixed-use projects located anywhere in the City of Sacramento.

Figure 5: City of Sacramento General Plan Table EC-1

Noise and vibration policy EC 3.1.2 specifies the City considers significant noise impacts to occur if a project would increase noise levels by more than the allowable limits shown in Table EC 2 (**Figure 6**).

Table EC 2 Exterior Incremental Noise Impact Standards for Noise-Sensitive Uses (dBA)

Residences and buildings where people normally sleep[a]		*Institutional land uses with primarily daytime and evening uses*[b]	
Existing L_{dn}	*Allowable Noise Increment*	*Existing Peak Hour L_{eq}*	*Allowable Noise Increment*
45	8	45	12
50	5	50	9
55	3	55	6
60	2	60	5
65	1	65	3
70	1	70	3
75	0	75	1
80	0	80	0

SOURCE: Federal Transit Administration, *Transit Noise Impact and Vibration Assessment*, May 2006

a. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.

b. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material.

Figure 6: City of Sacramento General Plan Table EC-2

City of Sacramento Municipal Code

The City of Sacramento Municipal Code, Section 8.68.060 establishes and allowable exterior noise level limit of 55 dBA L_{50} and 75 dBA L_{max} during daytime (7:00 a.m. to 10:00 p.m.) hours and 50 dBA L_{50} and 70 dBA L_{max} during nighttime (10:00 p.m. to 7:00 a.m.) for sources of noise which occur for more than 30 minutes per hour (L_{50}).

If the existing ambient noise level exceeds the 50/55 dBA L_{50} standard the allowable limit is increased in five dBA increments to encompass the ambient noise level. If the existing ambient noise level exceeds the 70/75 dBA L_{max} noise standard, the limit becomes the measured L_{max} existing ambient noise level. For example, if measured existing ambient daytime noise levels are 57 dBA L_{50} and 77 dBA L_{max}, the noise ordinance limits would be 60 dBA L_{50} and 77 dBA L_{max}.

Section 8.68.080.D, Exemptions, exempts from the Noise Ordinance standards those noise sources due to the erection (including excavation), demolition, alteration, or repair of any building or structure between the hours of 7 a.m. and 6 p.m., on Monday through Saturday, and between 9 a.m. and 6 p.m. on Sunday; provided, however, that the operation of an internal combustion engine shall not be exempt pursuant to this subsection if such engine is not equipped with suitable exhaust and intake silencers which are in good working order.

Criteria for Acceptable Vibration

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.

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 6**, which was developed by Caltrans, shows the vibration levels which would normally be required to result in damage to structures. The vibration levels are presented in terms of peak particle velocity in inches per second.

Table 6 indicates that the threshold for architectural damage to structures is 0.20 in/sec p.p.v. A threshold of 0.2 in/sec p.p.v. is considered to be a reasonable threshold for short-term construction projects.

TABLE 6: EFFECTS OF VIBRATION ON PEOPLE AND BUILDINGS

Peak Particle Velocity		Human Reaction	Effect on Buildings
mm/second	in/second		
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: *Transportation Related Earthborne Vibrations.* Caltrans. TAV-02-01-R9601. February 20, 2002.

IMPACTS AND MITIGATION MEASURES

THRESHOLDS OF SIGNIFICANCE

Appendix G of the CEQA Guidelines states that a project would normally be considered to result in significant noise impacts if noise levels conflict with adopted environmental standards or plans or if noise generated by the project would substantially increase existing noise levels at sensitive receivers on a permanent or temporary basis. Significance criteria for noise impacts are drawn from CEQA Guidelines Appendix G (Items XI [a-f]).

Would the project:

a. Expose persons to or generate noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

b. Expose persons to, or generate, excessive groundborne vibration or groundborne noise levels;

c. Cause a substantial permanent increase in ambient noise levels in the project vicinity above existing levels without the project;

d. Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing levels without the project;

e. Expose persons residing or working in the project area to excessive noise levels if located within an airport land use plan or where such a plan has not been adopted within 2 miles of a public airport or public use airport; or

f. Expose persons residing or working in the project area to excessive noise levels if located within the vicinity of a private airstrip.

ISSUES NOT EVALUATED FURTHER

The proposed project is not predicted to cause substantial changes in project-related off-site traffic patterns, or new vehicle trips. Therefore, assessment of off-site traffic has not been evaluated further as there would be no impact associated with this item.

PROJECT-SPECIFIC IMPACTS AND MITIGATION MEASURES

IMPACT 1: WOULD THE PROJECT RESULT IN 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?

As shown in Table 3, the proposed project would cause exterior noise levels to exceed the City of Sacramento 60 dBA L_{dn} General Plan Noise level standard for single-family residential uses, as well as the City's daytime and nighttime Municipal Code standards.

Impacts resulting from exterior noise levels exceeding the thresholds of significance due to project-related noise would be considered ***potentially significant***.

In order to reduce project noise levels to within the City of Sacramento exterior noise level standards, noise control measures were evaluated for the project. Specifically, a property line sound wall was evaluated for reducing exterior noise at the adjacent sensitive receptors. The results of this analysis are shown in **Table 7**. The resulting noise levels are shown graphically in terms of the day/night average (L_{dn}) level on **Figure 7**.

TABLE 7: PREDICTED NOISE LEVELS AT SENSITIVE RECEPTORS AROUND PROJECT SITE – WITH SOUND WALL

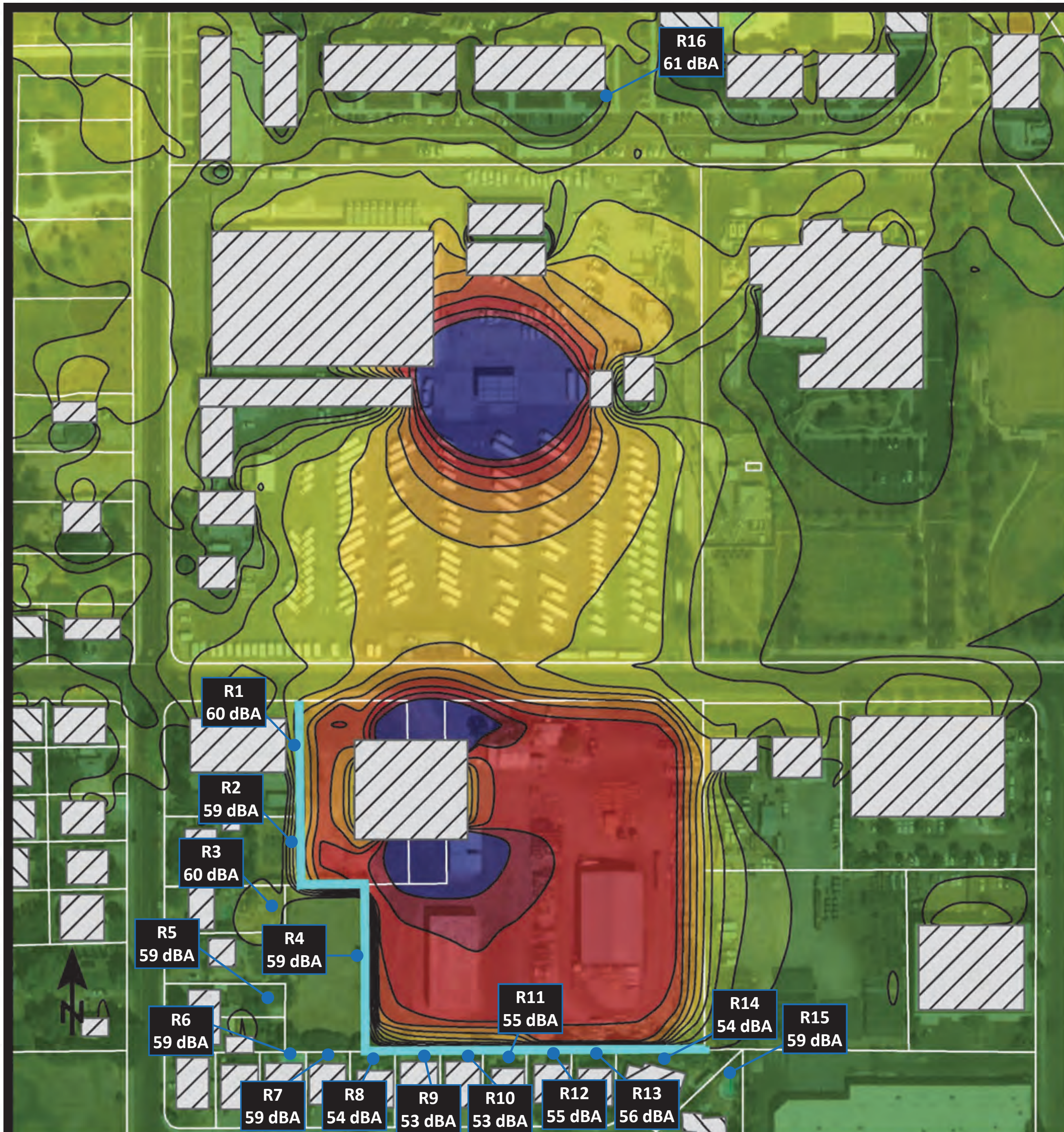
Receiver [1]	Existing Ambient Noise, dBA L_{dn}	Existing + Project* Noise, dBA L_{dn}	Change	Existing Ambient Noise, dBA L_{50}	Existing + Project* Noise, dBA L_{50}	Change	Existing Ambient Noise, dBA L_{max}	Existing + Project* Noise, dBA L_{max}	Change
R1	61	60	-1	60	59	-1	72	70	-2
R2	60	59	-1	58	58	0	68	68	0
R3	59	60	-1	58	58	0	68	68	0
R4	60	59	-1	58	57	-1	68	67	-1
R5	59	59	0	58	58	0	68	68	0
R6	59	59	0	58	58	0	68	68	0
R7	61	59	-2	60	58	-2	70	68	-2
R8	62	54	-8	60	53	-7	70	66	-4
R9	60	53	-7	59	52	-8	69	67	-3
R10	56	53	-3	55	52	-3	66	67	+1
R11	58	55	-3	57	54	-3	67	68	+1
R12	59	55	-4	58	54	-4	68	69	+1
R13	58	56	-2	57	55	-2	67	69	+2
R14	58	54	-4	57	53	-4	67	67	0
R15	59	59	0	58	58	0	69	69	0
R16	61	61	0	60	59	-1	74	69	-5
*With sound wall shown on Figure 8.									

The **Table 7** data indicate that a sound wall can be used to reduce project-related noise at the nearest senstivie receptors. As shown in **Table 7**, the proposed project would not cause day/night average (L_{dn}) noise levels to exceed the City's 60 dBA L_{dn} exterior noise level stanard for single-family residential uses or 65 dBA L_{dn} for multi-family residential uses.

Based upon the **Table 7** data, with mitigation, the proposed project would not casuse median L_{50} noise levels to exceed existing measured levels. In fact, with mitigation, L_{50} noise levels would be reduced by up to 8 dBA. Additionally, maximum noise levels would meet the City's 70 dBA L_{max} nighttime noise level standard with mitigation.

<u>Mitigation Measure(s)</u>
Implementation of the following mitigation measures would reduce the above impact to a *less-than-significant* level.

MM-1 *A masonry type sound wall shall be installed along the west and south project property lines. The approximate location and height of the barrier is shown on* ***Figure 7****.*



SCUSD New Transportation Facility

City of Sacramento, California

Figure 7

Existing Plus Project Noise Levels (dBA, L_{dn}) with Mitigation

Signs and symbols

- Parcel Line
- Wall
- Emission line
- Surface

Levels in dB(A)

<= 60
60 - 61
61 - 62
62 - 63
63 - 64
64 - 65
65 - 66
66 - 67
67 - 68
68 - 69
69 - 70
> 70

Receiver Noise Level

R#
dBA

1 : 2342

0 12.5 25 50 75 100 m

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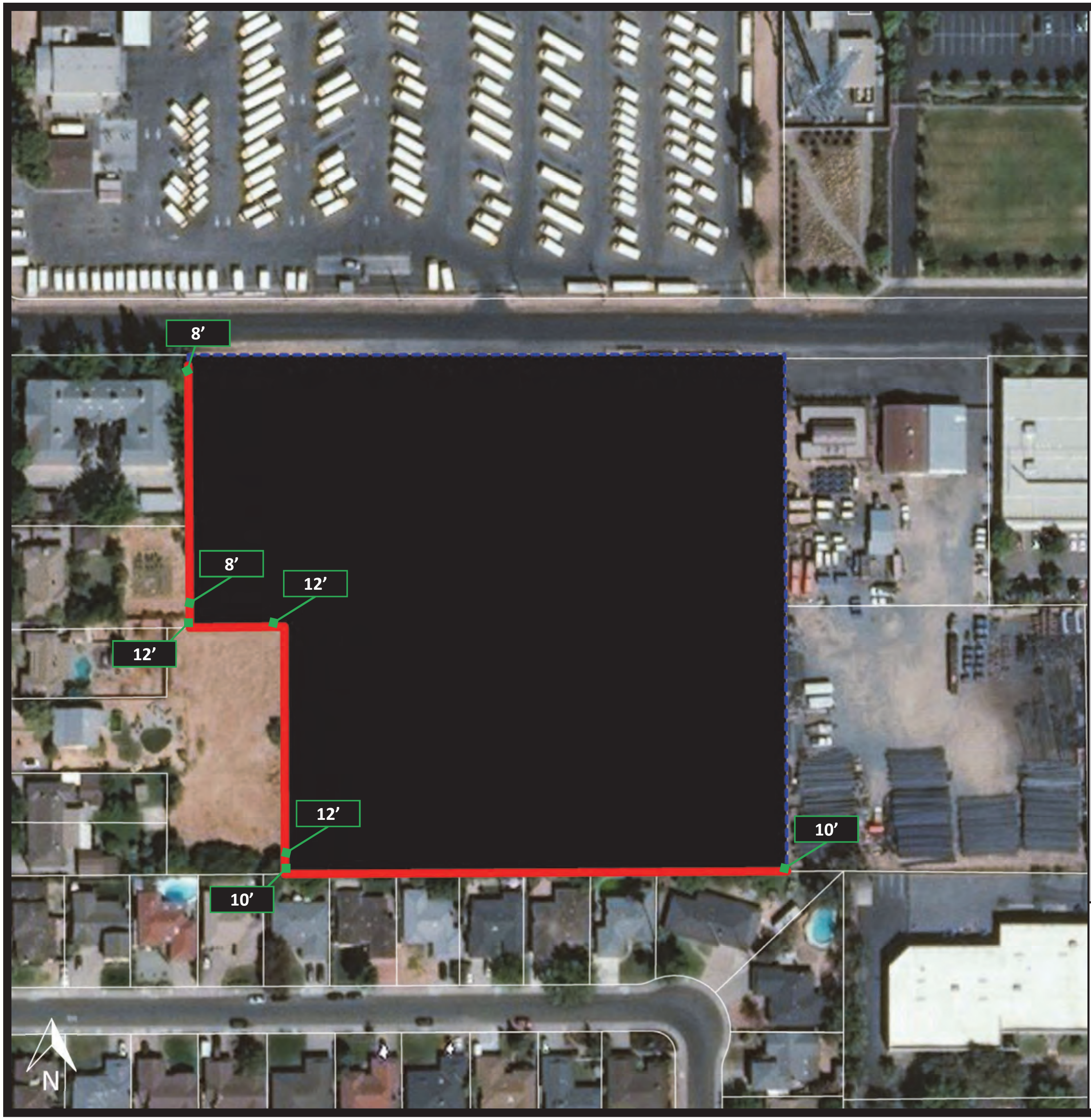

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Figure 8

Sound Wall Location and Heights

Minimum Wall Height (ft.)

X’

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IMPACT 2: WOULD THE PROJECT RESULT IN EXPOSURE OF PERSONS TO OR GENERATION OF EXCESSIVE GROUNDBORNE VIBRATION OR GROUNDBORNE NOISE LEVELS?

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.

The **Table 6** data indicate that construction vibration levels anticipated for the project are less than the 0.2 in/sec threshold at distances of 26 feet. Sensitive receptors which could be impacted by construction related vibrations, especially vibratory compactors/rollers, are located approximately 26 feet, or further, from typical construction activities. At these distances 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.

This is a **less-than-significant** impact and no mitigation is required.

IMPACT 3: WOULD THE PROJECT RESULT IN A SUBSTANTIAL PERMANENT INCREASE IN AMBIENT NOISE LEVELS IN THE PROJECT VICINITY ABOVE LEVELS EXISTING WITHOUT THE PROJECT?

As shown in **Table 7**, with mitigation measure MM-1, the project would not cause any increase in L_{dn} noise levels. Therefore, the project would comply with the City's allowable increase standards outlined in Table EC-2 (**Figure 6**) of the General Plan Noise Element. In fact, reductions in daily noise levels of -1 to -8 dBA L_{dn} are predicted at most locations.

This is a **less-than-significant** impact and no additional mitigation is required.

IMPACT 4: WOULD THE PROJECT RESULT IN ASUBSTANTIAL TEMPORARY OR PERIODIC INCREASE IN AMBIENT NOISE LEVELS IN THE PROJECT VICINITY ABOVE LEVELS EXISTING WITHOUT THE PROJECT?

During the construction phases of the project, noise from construction activities would add to the noise environment in the immediate project vicinity. As indicated in **Table 4**, activities involved in construction would generate maximum noise levels ranging from 76 to 90 dBA L_{max} at a distance of 50 feet. Most of the building construction would occur at distances of 50 feet or greater from the nearest residences. Construction noise associated with parking lot paving would be similar to noise that would be associated with public works projects, such as a roadway widening or street paving projects.

Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours. Additionally, construction activities would be shielded by the 8 to 12-foot-tall masonry sound wall required under mitigation measure MM-1.

Noise would also be generated during the construction phase by increased truck traffic on area roadways. A project-generated noise source would be truck traffic associated with transport of heavy materials and equipment to and from the construction site. This noise increase would be of short duration and would occur primarily during daytime hours.

The City of Sacramento exempts construction noise from the Noise Ordinance provisions if construction activity is limited to daytime hours. These exemptions are typical of City and County noise ordinances and reflect the recognition that construction-related noise is temporary in character, is generally acceptable when limited to daylight hours, and is part of what residents of urban areas expect as part of a typical urban noise environment (along with sirens, etc.)

This is a **less-than-significant** impact and no mitigation is required.

IMPACT 5: FOR A PROJECT LOCATED WITHIN AN AIRPORT LAND USE PLAN OR, WHERE SUCH A PLAN HAS NOT BEEN ADOPTED, WITHIN TWO MILES OF A PUBLIC AIRPORT OR PUBLIC USE AIRPORT, WOULD THE PROJECT EXPOSE PEOPLE RESIDING OR WORKING IN THE PROJECT AREA TO EXCESSIVE NOISE LEVELS?

There are no public airports in the project vicinity. Therefore, this impact is not applicable to the proposed project.

This is a **less-than-significant** impact and no mitigation is required.

IMPACT 6: FOR A PROJECT WITHIN THE VICINITY OF A PRIVATE AIRSTRIP, WOULD THE PROJECT EXPOSE PEOPLE RESIDING OR WORKING IN THE PROJECT AREA TO EXCESSIVE NOISE LEVELS?

There are no private airstrips in the project vicinity. Therefore, this impact is not applicable to the proposed project.

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Appendix A: Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space 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.
ASTC	Apparent Sound Transmission Class. Similar to STC but includes sound from flanking paths and correct for room reverberation. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Attenuation	The reduction of an acoustic signal.
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, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
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 +5 dBA and nighttime hours weighted by +10 dBA.
DNL	See definition of Ldn.
IIC	Impact Insulation Class. An integer-number rating of how well a building floor attenuates impact sounds, such as footsteps. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
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% of the time during the one-hour period.
Loudness	A subjective term for the sensation of the magnitude of sound.
NIC	Noise Isolation Class. A rating of the noise reduction between two spaces. Similar to STC but includes sound from flanking paths and no correction for room reverberation.
NNIC	Normalized Noise Isolation Class. Similar to NIC but includes a correction for room reverberation.
Noise	Unwanted sound.
NRC	Noise Reduction Coefficient. NRC is a single-number rating of the sound-absorption of a material equal to the arithmetic mean of the sound-absorption coefficients in the 250, 500, 1000, and 2,000 Hz octave frequency bands rounded to the nearest multiple of 0.05. It is a representation of the amount of sound energy absorbed upon striking a particular surface. An NRC of 0 indicates perfect reflection; an NRC of 1 indicates perfect absorption.
RT60	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 Sabin.
SEL	Sound Exposure Level. SEL is a rating, in decibels, of a discrete event, such as an aircraft flyover or train pass by, that compresses the total sound energy into a one-second event.
STC	Sound Transmission Class. STC is an integer rating of how well a building partition attenuates airborne sound. It is widely used to rate interior partitions, ceilings/floors, doors, windows and exterior wall configurations. The STC rating is typically used to rate the sound transmission of a specific building element when tested in laboratory conditions where flanking paths around the assembly don't exist. A larger number means more attenuation. The scale, like the decibel scale for sound, is logarithmic.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.
Impulsive	Sound of short duration, usually less than one second, with an abrupt onset and rapid decay.
Simple Tone	Any sound which can be judged as audible as a single pitch or set of single pitches.

Appendix B1 : Continuous Noise Monitoring Results

Site: LT-1

Project: SCUSD Transporation Facility

Meter: LDL 831-1

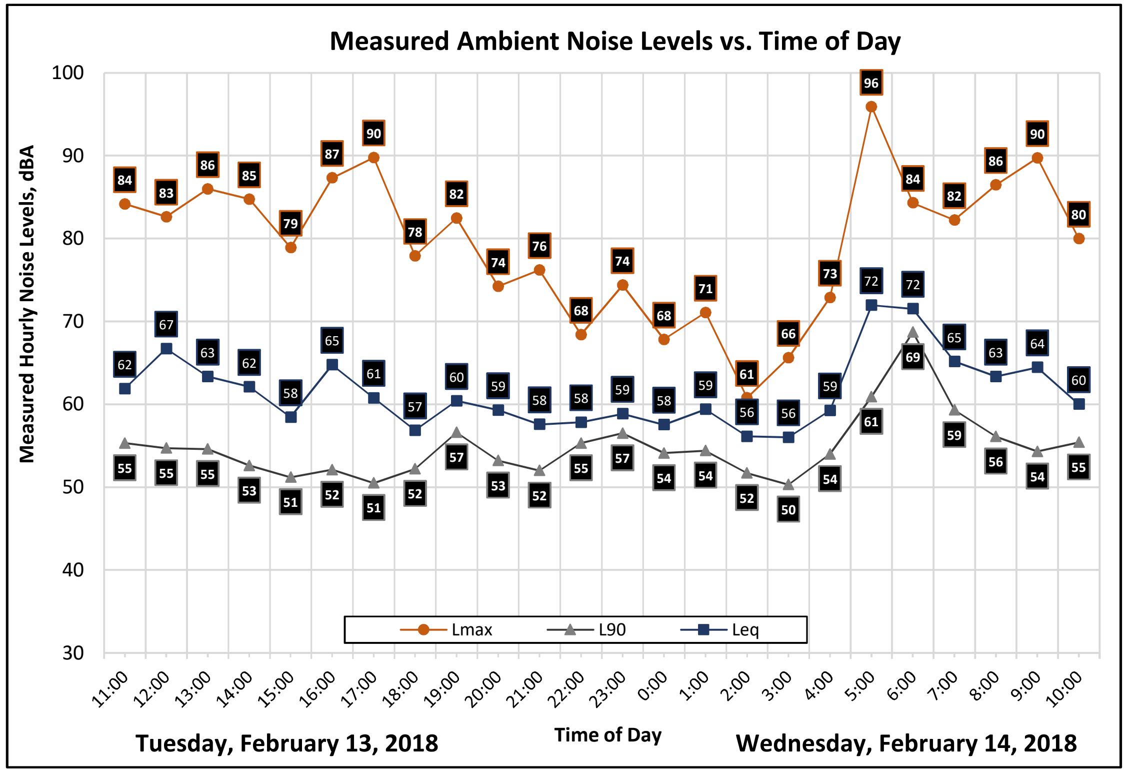
Location: 90' to fueling canopy, 150' to center of lot

Calibrator: B&K 4230

Coordinates: 38.545612° -121.421809°

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Tuesday, February 13, 2018	11:00	62	84	59	55
Tuesday, February 13, 2018	12:00	67	83	61	55
Tuesday, February 13, 2018	13:00	63	86	58	55
Tuesday, February 13, 2018	14:00	62	85	57	53
Tuesday, February 13, 2018	15:00	58	79	53	51
Tuesday, February 13, 2018	16:00	65	87	57	52
Tuesday, February 13, 2018	17:00	61	90	54	51
Tuesday, February 13, 2018	18:00	57	78	55	52
Tuesday, February 13, 2018	19:00	60	82	59	57
Tuesday, February 13, 2018	20:00	59	74	56	53
Tuesday, February 13, 2018	21:00	58	76	56	52
Tuesday, February 13, 2018	22:00	58	68	57	55
Tuesday, February 13, 2018	23:00	59	74	57	57
Wednesday, February 14, 2018	0:00	58	68	57	54
Wednesday, February 14, 2018	1:00	59	71	59	54
Wednesday, February 14, 2018	2:00	56	61	57	52
Wednesday, February 14, 2018	3:00	56	66	56	50
Wednesday, February 14, 2018	4:00	59	73	58	54
Wednesday, February 14, 2018	5:00	72	96	69	61
Wednesday, February 14, 2018	6:00	72	84	71	69
Wednesday, February 14, 2018	7:00	65	82	62	59
Wednesday, February 14, 2018	8:00	63	86	59	56
Wednesday, February 14, 2018	9:00	64	90	58	54
Wednesday, February 14, 2018	10:00	60	80	57	55

Statistics	Leq	Lmax	L50	L90
Day Average	63	83	57	54
Night Average	66	73	60	56
Day Low	57	74	53	51
Day High	67	90	62	59
Night Low	56	61	56	50
Night High	72	96	71	69
Ldn	72	Day %		44
CNEL	72	Night %		56

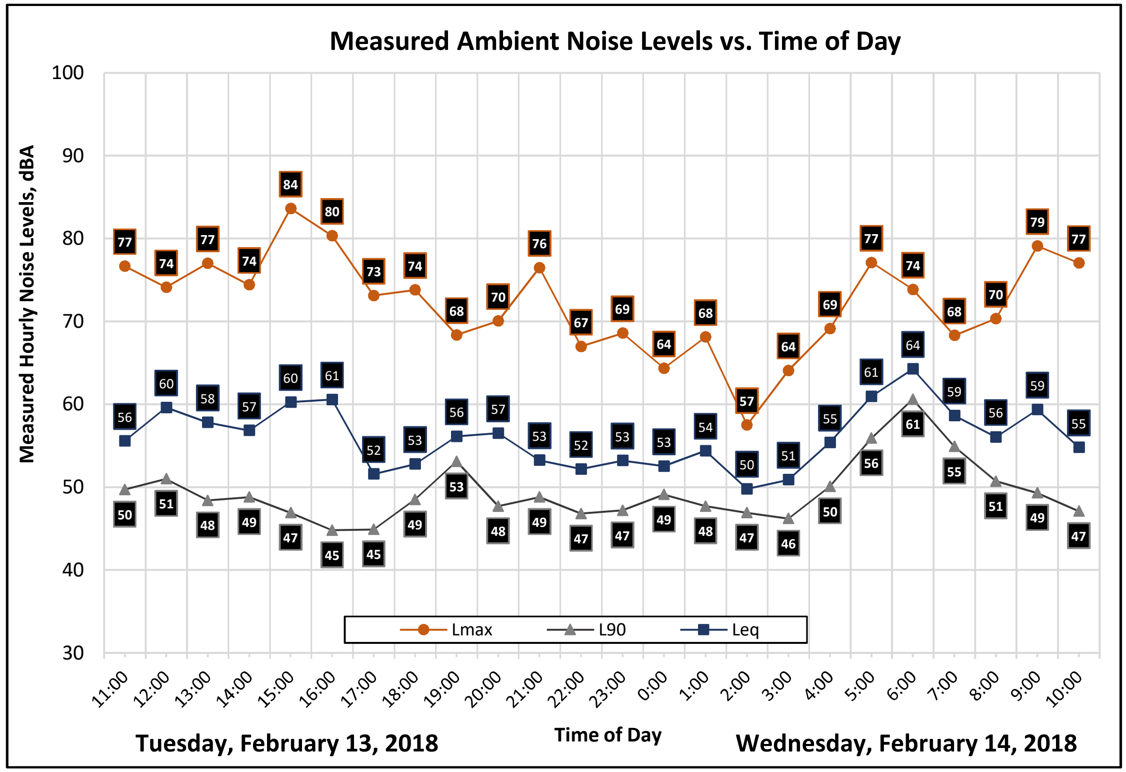


Appendix B2 : Continuous Noise Monitoring Results

Site: LT-2
Project: SCUSD Transporation Facility
Location: 250' to fueling canopy, 300' to center of lot
Coordinates: 38.545558° -121.420646°
Meter: LDL 831-2
Calibrator: B&K 4230

Date	Time	Measured Level, dBA			
		L_{eq}	L_{max}	L_{50}	L_{90}
Tuesday, February 13, 2018	11:00	56	77	52	50
Tuesday, February 13, 2018	12:00	60	74	57	51
Tuesday, February 13, 2018	13:00	58	77	52	48
Tuesday, February 13, 2018	14:00	57	74	52	49
Tuesday, February 13, 2018	15:00	60	84	50	47
Tuesday, February 13, 2018	16:00	61	80	51	45
Tuesday, February 13, 2018	17:00	52	73	47	45
Tuesday, February 13, 2018	18:00	53	74	50	49
Tuesday, February 13, 2018	19:00	56	68	55	53
Tuesday, February 13, 2018	20:00	57	70	50	48
Tuesday, February 13, 2018	21:00	53	76	51	49
Tuesday, February 13, 2018	22:00	52	67	48	47
Tuesday, February 13, 2018	23:00	53	69	49	47
Wednesday, February 14, 2018	0:00	53	64	52	49
Wednesday, February 14, 2018	1:00	54	68	51	48
Wednesday, February 14, 2018	2:00	50	57	49	47
Wednesday, February 14, 2018	3:00	51	64	48	46
Wednesday, February 14, 2018	4:00	55	69	54	50
Wednesday, February 14, 2018	5:00	61	77	60	56
Wednesday, February 14, 2018	6:00	64	74	63	61
Wednesday, February 14, 2018	7:00	59	68	57	55
Wednesday, February 14, 2018	8:00	56	70	53	51
Wednesday, February 14, 2018	9:00	59	79	52	49
Wednesday, February 14, 2018	10:00	55	77	49	47

Statistics	Leq	Lmax	L50	L90
Day Average	57	75	52	49
Night Average	58	68	53	50
Day Low	52	68	47	45
Day High	61	84	57	55
Night Low	50	57	48	46
Night High	64	77	63	61
Ldn	64	Day %		61
CNEL	64	Night %		39



Appendix B3 : Continuous Noise Monitoring Results

Site: LT-3
Project: SCUSD Transporation Facility
Meter: LDL 812-1
Location: 850' to fueling canopy, 675' to center of lot
Calibrator: B&K 4230
Coordinates: 38.543407° -121.422123°

Date	Time	Measured Level, dBA L_{eq}	L_{max}	L_{50}	L_{90}
Tuesday, February 13, 2018	11:00	53	67	52	50
Tuesday, February 13, 2018	12:00	52	62	51	49
Tuesday, February 13, 2018	13:00	50	63	49	45
Tuesday, February 13, 2018	14:00	51	66	50	47
Tuesday, February 13, 2018	15:00	49	65	48	46
Tuesday, February 13, 2018	16:00	52	69	46	42
Tuesday, February 13, 2018	17:00	47	56	46	44
Tuesday, February 13, 2018	18:00	51	59	51	49
Tuesday, February 13, 2018	19:00	54	63	54	52
Tuesday, February 13, 2018	20:00	53	72	49	46
Tuesday, February 13, 2018	21:00	51	65	49	47
Tuesday, February 13, 2018	22:00	50	63	47	43
Tuesday, February 13, 2018	23:00	51	65	47	44
Wednesday, February 14, 2018	0:00	51	62	51	48
Wednesday, February 14, 2018	1:00	54	69	50	46
Wednesday, February 14, 2018	2:00	50	62	49	46
Wednesday, February 14, 2018	3:00	50	64	47	45
Wednesday, February 14, 2018	4:00	55	64	54	50
Wednesday, February 14, 2018	5:00	59	64	59	56
Wednesday, February 14, 2018	6:00	61	70	60	58
Wednesday, February 14, 2018	7:00	56	65	55	54
Wednesday, February 14, 2018	8:00	52	62	51	50
Wednesday, February 14, 2018	9:00	51	59	50	49
Wednesday, February 14, 2018	10:00	50	87	48	47

Statistics	Leq	Lmax	L50	L90
Day Average	52	65	50	48
Night Average	55	65	51	48
Day Low	47	56	46	42
Day High	56	87	55	54
Night Low	50	62	47	43
Night High	61	70	60	58
Ldn	61	Day %		43
CNEL	62	Night %		57