Noise Analysis for the National City CarMax Project National City, California

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Acronyms

ADT	average daily traffic
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
City	National City
CNEL	community noise equivalent level
CUP	Conditional Use Permit
dB	decibel
dB(A)	A-weighted decibel
EQRs	Environmental Quality Regulations
FTA	Federal Transit Administration
I-805	Interstate 805
HVAC	heating, ventilating, and air conditioning
L_{eq}	one-hour equivalent noise level
L_{pw}	sound power level
LOS	Level of Service
LUC	Land Use Code
SR-54	State Route 54

Executive Summary

The proposed National City CarMax (project) site is at the southwest corner of the intersection of Sweetwater Road and Plaza Bonita Road in National City, California. The project includes a General Plan Amendment, Rezone, Land Use Code (LUC) Amendment, Tentative Parcel Map, and Conditional Use Permit to allow development of a CarMax pre-owned automobile dealership, service building and non-public carwash with associated access drives, parking lots, and landscaped areas.

This report discusses potential noise impacts from the construction and operation of the project. As part of this assessment, noise levels due to vehicle traffic were calculated and evaluated against the National City (City) noise and land use compatibility guidelines. In addition to compatibility, the potential for noise to impact adjacent uses from future on-site sources and construction activity was assessed. A summary of the findings is provided below.

Construction Noise

There are residential uses located to the north and east of the project site. Construction activities would generally occur between 7:00 a.m. and 5:00 p.m. on weekdays. Hourly equivalent construction noise levels would range from 53 to 66 average A-weighted decibels [dB(A) L_{eq}] at the adjacent uses. While construction may be heard over other noise sources in the area, the exposure would be temporary and would not exceed the City's standards.

Traffic Noise

On-Site Traffic Noise

Automotive and service commercial land uses are compatible with noise levels up to 70 community noise equivalent level (CNEL) and conditionally compatible with noise levels above 70 CNEL. As demonstrated in this analysis, exterior noise levels are projected to be 70 CNEL or less across a majority of the project site and less than 70 CNEL at the proposed buildings, which would be compatible with City standards. Exterior noise levels at the project boundaries immediately adjacent to State Route 54 and Plaza Bonita would exceed 70 CNEL; however, parking lots would be constructed in this area and noise levels would not interfere with outdoor activities.

Off-Site Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. A change of 3 dB(A) is conservatively considered a substantial increase in ambient traffic noise levels. A 3 d(B) increase occurs when there is a doubling of traffic volumes. The addition of project traffic to area roadways would not result in a doubling of traffic volumes,

and the resulting noise level increase would be less than 3 dB(A) which would not be perceivable.

On-site Generated Noise

Noise sources associated with project operation would include rooftop heating, ventilation, and air conditioning units, as well as a blower, vacuum, and air compressor at the proposed carwash. On-site generated noise levels would range from 37 to 43 dB(A) L_{eq} at the residential property lines and 41 to 47 dB(A) L_{eq} at the commercial property lines. These noise levels would not exceed the applicable daytime and nighttime noise level limits in the Municipal Code.

1.0 Introduction

1.1 Project Description

The project site is located at the southwest corner of the intersection of Sweetwater Road and Plaza Bonita Road in National City, California. The project site is bounded by State Route 54 (SR-54) to the north, Sweetwater Road to the east, Plaza Bonita Road to the south, and the Sweetwater River to the west. Figures 1 and 2 show the regional location of the project site and an aerial photograph of the project site. Commercial uses are located south of the project site, single-family residential uses are located east and north of the project site, and a mobile home park is located north of the project site.

The project site would consist of two distinct pieces of land: the 15.08-acre project parcel and the 2.90-acre Offsite Area. The proposed CarMax facility and earthen channel would be constructed on the 15.08-acre project parcel, while the 2.90-acre Offsite Area consists of California Department of Transportation (Caltrans) and City Right-of-Way (ROW) that would be temporarily impacted during construction. On the project parcel, the project proposes to construct a CarMax pre-owned automobile dealership, service building, non-public carwash, a customer/employee parking lot, a sales inventory lot, a staging lot, two public access driveways, one restricted access driveway, and landscaped areas within approximately 7.19 acres. The CarMax facility buildings would total approximately 18,774 square feet and include 157 parking spaces for customers and employees. The CarMax facility would also include 401 vehicle stalls in a sales inventory lot, and the facility reserves 0.9 acre for vehicle staging where cars are stored while waiting to be serviced. The project would also make frontage improvements to add a sidewalk along Plaza Bonita Road and would relocate an existing sewer line that traverses the project site into the centerline of Plaza Bonita Road.

Due to the elevation and adjacency to the unnamed creek, development of the project parcel would require grading of the property resulting in a net import of approximately 166,379 cubic yards (5,536 cubic yards of cut, 171,915 cubic yards of fill). Additionally, the project would recontour and redirect approximately 2,012 linear feet of the unnamed creek located on the project parcel by constructing an earthen channel that would traverse the northwestern boundary of the property. Figure 3 presents the proposed site plan.

The project includes a General Plan Amendment, Rezone, Land Use Code (LUC) Amendment, tentative parcel map, and Conditional Use Permit (CUP) to allow development of a CarMax pre-owned automobile dealership, service building, and non-public carwash with associated access drives, parking lots, and landscaped areas.

Project Location

FIGURE 1
Regional Location

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Image Source: Nearmap (flown May 2020)

FIGURE 2

Project Location on Aerial Photograph

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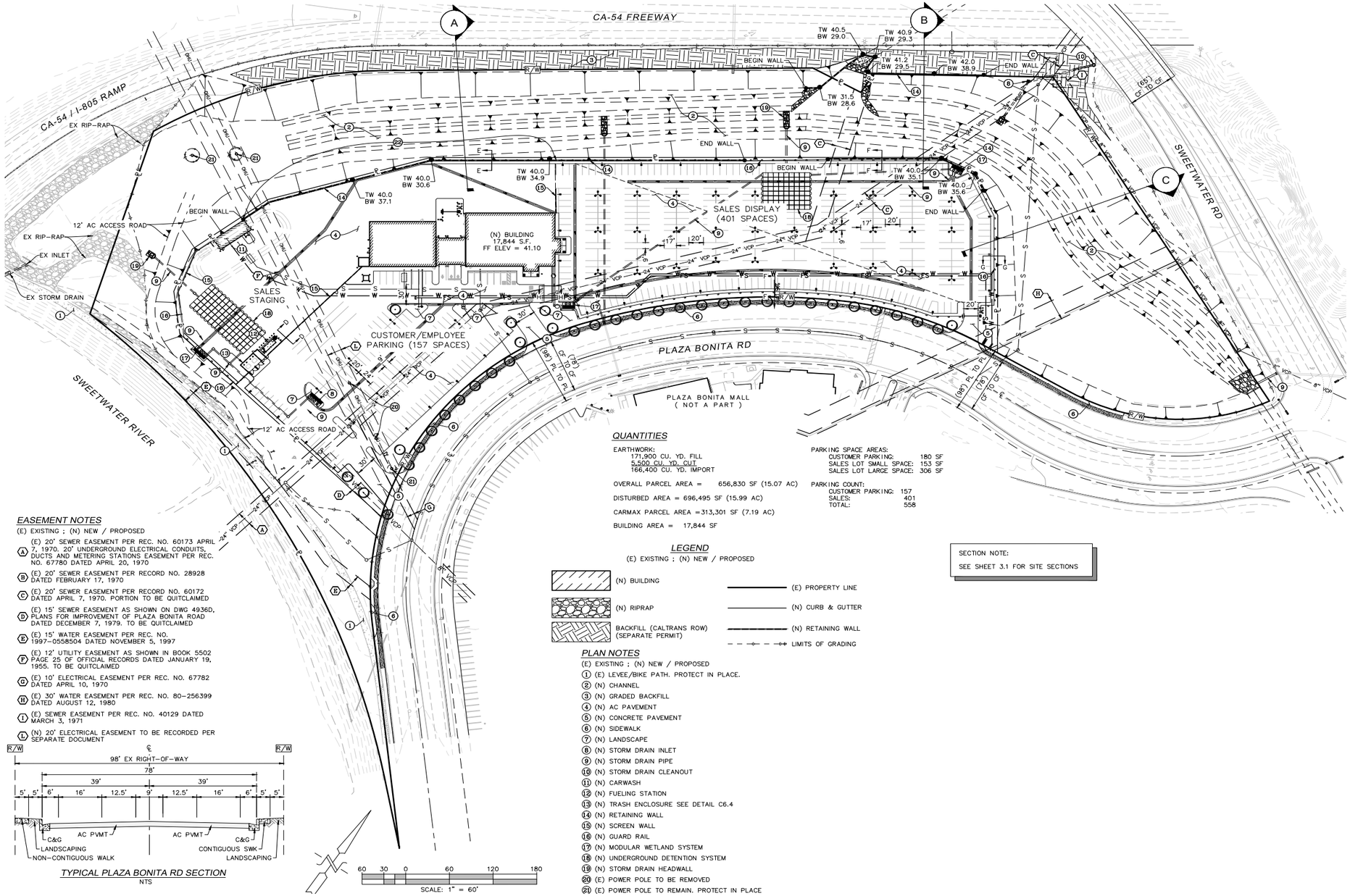

QUANTITIES

EARTHWORK:
171,900 CU. YD. FILL
5,500 CU. YD. CUT
166,400 CU. YD. IMPORT

OVERALL PARCEL AREA = 656,830 SF (15.07 AC)

DISTURBED AREA = 696,495 SF (15.99 AC)

CARMAX PARCEL AREA = 313,301 SF (7.19 AC)

BUILDING AREA = 17,844 SF

PARKING SPACE AREAS:
CUSTOMER PARKING: 180 SF
SALES LOT SMALL SPACE: 153 SF
SALES LOT LARGE SPACE: 306 SF

PARKING COUNT:
CUSTOMER PARKING: 157
SALES: 401
TOTAL: 558

LEGEND

(E) EXISTING ; (N) NEW / PROPOSED

- (N) BUILDING
- (N) RIPRAP
- BACKFILL (CALTRANS ROW) (SEPARATE PERMIT)
- (E) PROPERTY LINE
- (N) CURB & GUTTER
- (N) RETAINING WALL
- LIMITS OF GRADING

PLAN NOTES

(E) EXISTING ; (N) NEW / PROPOSED

1. (E) LEVEE/BIKE PATH. PROTECT IN PLACE.
2. (N) CHANNEL
3. (N) GRADED BACKFILL
4. (N) AC PAVEMENT
5. (N) CONCRETE PAVEMENT
6. (N) SIDEWALK
7. (N) LANDSCAPE
8. (N) STORM DRAIN INLET
9. (N) STORM DRAIN PIPE
10. (N) STORM DRAIN CLEANOUT
11. (N) CARWASH
12. (N) FUELING STATION
13. (N) TRASH ENCLOSURE SEE DETAIL C6.4
14. (N) RETAINING WALL
15. (N) SCREEN WALL
16. (N) GUARD RAIL
17. (N) MODULAR WETLAND SYSTEM
18. (N) UNDERGROUND DETENTION SYSTEM
19. (N) STORM DRAIN HEADWALL
20. (E) POWER POLE TO BE REMOVED
21. (E) POWER POLE TO REMAIN. PROTECT IN PLACE

SECTION NOTE:
SEE SHEET 3.1 FOR SITE SECTIONS

EASEMENT NOTES

(E) EXISTING ; (N) NEW / PROPOSED

- (A) (E) 20' SEWER EASEMENT PER REC. NO. 60173 APRIL 7, 1970. 20' UNDERGROUND ELECTRICAL CONDUITS, DUCTS AND METERING STATIONS EASEMENT PER REC. NO. 67780 DATED APRIL 20, 1970
- (B) (E) 20' SEWER EASEMENT PER RECORD NO. 28928 DATED FEBRUARY 17, 1970
- (C) (E) 20' SEWER EASEMENT PER RECORD NO. 60172 DATED APRIL 7, 1970. PORTION TO BE QUITCLAIMED
- (D) (E) 15' SEWER EASEMENT AS SHOWN ON DWG 4936D, PLANS FOR IMPROVEMENT OF PLAZA BONITA ROAD DATED DECEMBER 7, 1979. TO BE QUITCLAIMED
- (E) (E) 15' WATER EASEMENT PER REC. NO. 1997-0558504 DATED NOVEMBER 5, 1997
- (F) (E) 12' UTILITY EASEMENT AS SHOWN IN BOOK 5502 PAGE 25 OF OFFICIAL RECORDS DATED JANUARY 19, 1955. TO BE QUITCLAIMED
- (G) (E) 10' ELECTRICAL EASEMENT PER REC. NO. 67782 DATED APRIL 10, 1970
- (H) (E) 30' WATER EASEMENT PER REC. NO. 80-256399 DATED AUGUST 12, 1980
- (I) (E) SEWER EASEMENT PER REC. NO. 40129 DATED MARCH 3, 1971
- (L) (N) 20' ELECTRICAL EASEMENT TO BE RECORDED PER SEPARATE DOCUMENT

TYPICAL PLAZA BONITA RD SECTION
NTS

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FIGURE 3
Site Plan

The proposed General Plan Amendment and Rezone would change the existing General Plan Designation and Zoning of the CarMax Facility portion of the project parcel from the Major Mixed-Use designation and the Major Mixed-Use District (MXD-2) zone to the Service Commercial General Plan designation and zone. The proposed General Plan Amendment and Rezone would also change the existing land use designation and zoning of the earthen channel portion of the project parcel and the Offsite Area from the Major Mixed-Use designation and the MXD-2 zone to the Open Space land use designation and zone. The LUC amendment is proposed to make automobile sales an allowed use in the CS zone subject to approval of a CUP. The project includes a CUP for the proposed CarMax. A tentative parcel map is also proposed to subdivide the project parcel into two lots so the proposed CarMax facility and the earthen channel would be located on separate parcels.

1.2 Fundamentals of Noise

Sound levels are described in units called the decibel (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used for earthquake magnitudes. Thus, a doubling of the energy of a noise source, such as doubling of traffic volume, would increase the noise level by 3 dB; a halving of the energy would result in a 3 dB decrease. However, human perception of noise has no simple correlation with acoustical energy. A change in noise levels is generally perceived as follows: 3 A-weighted dB [dB(A)] barely perceptible, 5 dB(A) readily perceptible, and 10 dB(A) perceived as a doubling or halving of noise (Caltrans 2013).

In technical terms, sound levels are described as either a "sound power level" or a "sound pressure level," which while commonly confused are two distinct characteristics of sound. Both share the same unit of measure, the dB. However, sound power, expressed as L_{pw}, is the energy converted into sound by the source. As sound energy travels through the air, it creates a sound wave that exerts pressure on receivers such as an ear drum or microphone, the sound pressure level. Sound measurement instruments only measure sound pressure, and limits used in standards are generally sound pressure levels.

The human ear is not equally sensitive to all frequencies within the sound spectrum. To accommodate this phenomenon, the A-scale, which approximates the frequency response of the average young ear when listening to most ordinary everyday sounds, was devised. When people make relative judgments of the loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Therefore, the "A-weighted" noise scale is used for measurements and standards involving the human perception of noise. Noise levels using A-weighted measurements are designated with the notation dB(A).

1.2.1 Descriptors

The impact of noise is not a function of loudness alone. The time of day when noise occurs and the duration of the noise are also important. In addition, most noise that lasts for more

than a few seconds is variable in its intensity. Consequently, a variety of noise descriptors has been developed. The noise descriptors used for this study are the equivalent noise level (L_{eq}) and the community noise equivalent level (CNEL).

The L_{eq} is the equivalent steady-state noise level in a stated period of time that is calculated by averaging the acoustic energy over a time period; when no period is specified, a 1-hour period is assumed.

The CNEL is a 24-hour equivalent sound level. The CNEL calculation applies an additional 5 dB(A) penalty to noise occurring during evening hours, between 7:00 p.m. and 10:00 p.m., and a 10 dB(A) penalty is added to noise occurring during the night, between 10:00 p.m. and 7:00 a.m. These increases for certain times are intended to account for the added sensitivity of humans to noise during the evening and night.

1.2.2 Propagation

Sound from a localized source (approximating a "point" source) radiates uniformly outward as it travels away from the source in a spherical pattern, known as geometric spreading. The sound level decreases or drops off at a rate of 6 dB(A) for each doubling of the distance.

Traffic noise is not a single, stationary point source of sound. The movement of vehicles makes the source of the sound appear to emanate from a line (line source) rather than a point when viewed over some time interval. The drop-off rate for a line source is 3 dB(A) for each doubling of distance.

The propagation of noise is also affected by the intervening ground, known as ground absorption. A hard site (such as parking lots or smooth bodies of water) receives no additional ground attenuation, and the changes in noise levels with distance (drop-off rate) are simply the geometric spreading of the source. A soft site (such as soft dirt, grass, or scattered bushes and trees) provides an additional ground attenuation value of 1.5 dB(A) per doubling of distance. Thus, a point source over a soft site would drop off at 7.5 dB(A) per doubling of distance.

2.0 Applicable Noise Standards

2.1 General Plan

The Noise and Nuisance Element of the City's General Plan establishes noise and land use compatibility standards and outlines goals and policies to achieve these standards. Table 1 summarizes the land use compatibility standards. As shown, automotive and service commercial land uses are compatible with noise levels up to 70 CNEL and conditionally compatible with noise levels above 70 CNEL.

Table 1
Land Use – Noise Compatibility Guidelines

Land Use Category	Exterior Noise Exposure (CNEL <60	60-65	65-70	70-75	75+
Residential Land Uses					
Single-family, Mobile Homes, Senior Housing		45*	45*	45*	
Multi-family			45*	45*	
Minor Mixed-Use, Major Mixed-Use			45*	45*	45*
Commercial					
Automotive, Service Commercial					
Office					
Shopping Center					
Visitor Accommodations			45*	45*	45*
Industrial					
Institutional					
Infrastructure (water treatment facilities, electrical substations)					
Worship Facilities, Educational Facilities, Community Centers, Libraries, Museums and Cultural Centers		45*	45*	45*	
Open Space, Parks and Recreation					
Community and Neighborhood Parks					
Golf Courses, Athletic Fields					

*Interior noise level

	Compatible	Indoor Uses	Standard construction methods should attenuate exterior noise to an acceptable indoor noise level.
		Outdoor Uses	Activities associated with the land use may be carried out.
	Conditionally Compatible	Indoor Uses	Building structure must attenuate exterior noise to the indoor noise level. Conventional construction, but with closed windows and fresh air supply systems will normally suffice.
		Outdoor Uses	Best practices for reducing noise interference should be incorporated to make outdoor activities acceptable.
	Normally Incompatible	Indoor Uses	If new construction or development does proceed, a detailed acoustical analysis is needed to identify the noise reduction requirements, and needed noise insulation features shall be included in the design.
		Outdoor Uses	Feasible noise mitigation techniques shall be analyzed and incorporated to make the outdoor activities acceptable.
	Incompatible	Indoor Uses	New construction should not be undertaken.
		Outdoor Uses	Severe noise interference makes outdoor activities unacceptable.

SOURCE: City of National City 2011.

2.2 Municipal Code

Title 12 of the National City Municipal Code establishes prohibitions for disturbing, excessive, or offensive noise, and provisions such as sound level limits for the purpose of securing and promoting the public health, comfort, safety, peace, and quiet for its citizens. The sections of Title 12 that are applicable to the project are presented below.

12.06.020 Maximum permissible sound levels by receiving land use.

A. The noise standards presented in Table III of this chapter [Table 2 in this report] for various categories of land uses defined in Chapter 18.10 of the City's Land Use Code shall, unless otherwise specifically indicated, apply to each property or portion of property substantially used for a particular type of land use reasonably similar to the land use types shown in [Table 2]. Where two or more dissimilar land uses occur on a single property, the more restrictive noise limits shall apply.

B. Additional land use classifications may be added by resolution of the Planning Commission to reflect both lower and higher existing ambient levels than those shown.

C. Where doubt exists when making identification of receiving land use, the Planning Commission may make an interpretation in the manner provided by Section 18.134.020 of the land use code.

D. No person shall operate or cause to be operated any source of sound at any location within the city or allow the creation of any noise on property owned, leased, occupied or otherwise controlled by such person, which causes the noise level to exceed the environmental noise level or nuisance noise level, or both, of the applicable limits given in [Table 2] of this chapter at any point on or beyond the boundaries of the property on which the sound is produced.

E. 1. Environmental noise shall be assessed by the A-weighted equivalent sound level (L_{eq}) for any hour ($L_{eq(h)}$).

2. Nuisance noise shall be assessed as an A-weighted sound level not to be exceeded at any time. Nuisance noise is not subject to hourly averaging as $L_{eq(h)}$. The sound level of an event may be assessed by sound level meters or recording devices, or by other objective methods. However, failure or inability to conduct measurements of the sound level shall not bar enforcement or abatement.

3. Sound levels by receiving land. use shall be measured at the boundary of the property on which the sound is produced (generated) or at any point within the boundary of the property affected.

4. Fixed location public utility distribution or fixed transmission facilities located on or adjacent to a property line shall be subject to noise level limits of this section measured at or beyond six feet from the boundary of the easement upon which the equipment is located.

Table 2 Title 12, Section 12.06.020 – Exterior Sound Limit Levels		
Zone	Allowable Noise Level [dB(A) L_{eq}]	
	10 p.m. to 7 a.m.	7 a.m. to 10 p.m.
All Residential (less than 9 dwelling units)	45	55
Multi-unit Residential (consisting of 9 dwelling units or more and Public Space)	50	60
Commercial	60	65
Light Industry (Industry east of I-5)	70	70
Heavy Industry (Industry west of I-5)	80	80
SOURCE: National City Municipal Code, Title 12 – Noise Control – Table III.		

12.06.040 Corrections to exterior noise level limits.

A. If the noise is continuous as defined in Section 12.04.120, the L_{eq} for any hour can be represented by any lesser time period within that hour. Noise measurements of a few minutes only will thus suffice to define the noise level.

B. If the noise is intermittent as defined in Section 12.04.320, the L_{eq} for any hour may be represented by a time period typical of the operating cycle. Measurement should be made of a representative number of noisy/quiet periods. A measurement period of not less than fifteen minutes is, however, strongly recommended when dealing with intermittent noise.

C. In the event the alleged offensive noise contains a steady, audible sound such as a whine, screech, or hum, or contains a repetitive impulsive noise such as hammering or riveting, or contains music or speech, the standard limits set forth in [Table 2] shall be reduced by five dB.

D. If the measured ambient level exceeds that permissible in [Table 2], the allowable noise level standard shall be the ambient noise level. The ambient level shall be measured when the alleged noise violation source is not operating.

12.10.160 Construction/Demolition.

A. Except as provided in Section 12.10.160 B, it is unlawful to operate or to allow or cause the operation of any tools or equipment used in construction, drilling, repair, alteration, or demolition work between weekday hours of seven p.m. and seven a.m., or at any time on weekends or holidays, such that the sound there from creates a noise across a residential or commercial real property line that violates the provisions of section 12.06.020.

B. Subsection A shall not apply to: emergency work performed by public service utilities; work on private property that is necessary for fire and life safety; work permitted pursuant to Chapter 12.16; or, to the use of domestic power tools as allowed in Section 12.10.300.

C. Noise from construction demolition activities shall not exceed the maximum noise levels at or within the boundaries of affected properties listed in the following schedule [Table 3] at all other times.

Table 3
Title 12, Section 12.10.160 – Construction Noise Limit Levels

	Type I Areas – Residential	Type II Areas – Semi-Residential/Commercial
Mobile Equipment		
Daily, except Sundays and legal holidays, between seven a.m. to seven p.m.	75	85
Stationary Equipment		
Daily, except Sundays and legal holidays, between seven a.m. to seven p.m.	60	70
SOURCE: National City Municipal Code, Title 12 – Noise Control. Section 12.10.160.		

3.0 Existing Conditions

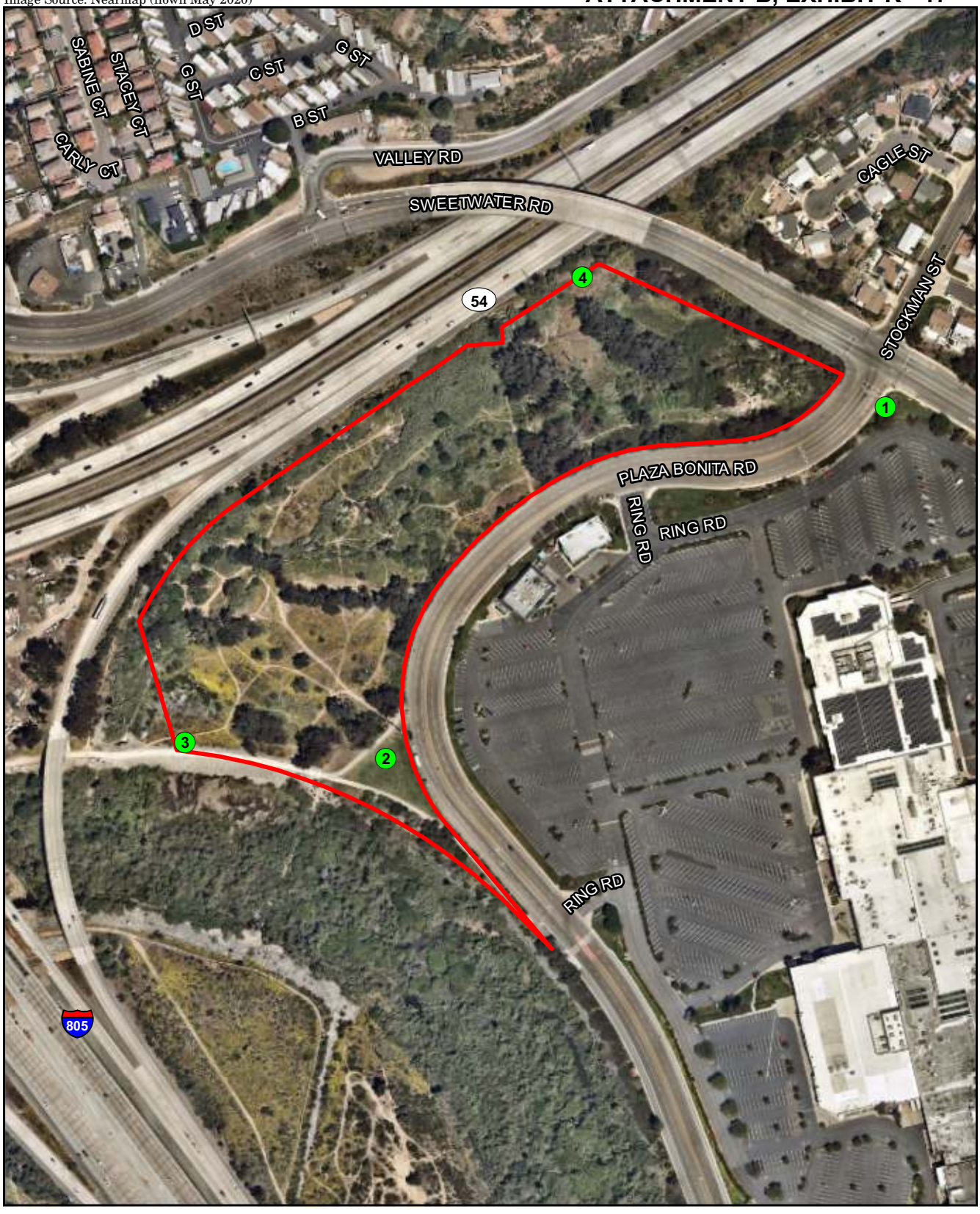
Existing noise levels in the vicinity of the project site were measured on August 9, 2016, using a Larson-Davis Model LxT, Type 1 Integrating Sound Level Meter, serial number 3828. The following parameters were used:

Filter:	A-weighted
Response:	Slow
Interval Period	1 minute
Time History Period:	5 seconds

The meter was calibrated before and after each measurement. The meter was set 5 feet above the ground level for each measurement.

Noise measurements were taken to obtain typical ambient noise levels at the project site and in the vicinity. The weather was warm and sunny with a slight breeze, one to five miles per hour on average. Four 15-minute measurements were taken, as described below. The primary sources of on-site noise were due to traffic on Interstate 805 (I-805), SR-54, Sweetwater Road, and Plaza Bonita Road. The measurement locations are shown on Figure 4, and detailed data are contained in Attachment 1.

Image Source: Nearmap (flown May 2020)



Parcel Boundary

Noise Measurement Locations

FIGURE 4

Noise Measurement Locations

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Measurement 1 was located east of the project site, at the corner of Sweetwater Road and Plaza Bonita Road, approximately 50 feet south of Sweetwater Road. The main noise source at this location was vehicle traffic on Sweetwater Road. Vehicle traffic on SR-54 and Plaza Bonita Road was also audible. Secondary sources of noise were parking lot activities. Vehicle traffic on Sweetwater Road was counted during the measurement period.

Measurement 2 was located near the southern project boundary, 50 feet west of Plaza Bonita Road. The main noise source at this location was vehicle traffic on Plaza Bonita Road. Vehicle traffic on I-805, SR-54, and the ramp from I-805 to SR-54 was also audible. Vehicle traffic on Plaza Bonita Road was counted during the measurement period.

Measurement 3 was located at the southwestern corner of the project site, adjacent to a paved bike path. The main noise source at this location was vehicle traffic on I-805. Vehicle traffic on SR-54 and the ramp from I-805 to SR-54 was also audible.

Measurement 4 was located at the northern project boundary, approximately 50 feet southeast of SR-54. The main noise source at this location was vehicle traffic on SR-54. Vehicle traffic on Sweetwater Road was also audible.

Noise measurements are summarized in Table 4. Traffic counts conducted during Measurements 1 and 2 are summarized in Table 5.

Table 4
Noise Measurements

Measurement	Location	Time	L_{eq}	L_{90}	Noise Sources
1	50 feet south of Sweetwater Road	10:50 a.m. – 11:05 a.m.	65.8	60.7	Vehicle traffic on Sweetwater Road
2	50 feet west of Plaza Bonita Road	11:26 a.m. – 11:41 a.m.	64.6	62.9	Vehicle traffic on Plaza Bonita Road
3	Southwest corner of project site, near I-805	11:53 a.m. – 12:08 p.m.	66.0	63.6	Vehicle traffic on I-805
4	50 feet southeast of SR-54	12:32 p.m. – 12:47 p.m.	73.0	70.7	Vehicle traffic on SR-54

Note: Noise measurement data are contained in Attachment 1.

Table 5
15-minute Traffic Counts

Measurement	Roadway	Direction	Automobiles	Medium Trucks	Heavy Trucks	Buses	Motorcycles
1	Sweetwater Road	Westbound	106	1	0	1	0
		Eastbound	109	2	0	1	1
2	Plaza Bonita Road	Northbound	31	0	0	0	0
		Southbound	22	0	0	0	1

Note: Traffic counts were not conducted during Measurements 3 and 4.

4.0 Analysis Methodology

Noise level predictions and contour mapping were developed using noise modeling software, SoundPlan Essential, version 4.1 (Navcon Engineering 2018). SoundPLAN calculates noise propagation based on the International Organization for Standardization method (ISO 9613-2 – Acoustics, Attenuation of Sound during Propagation Outdoors). The model calculates noise levels at selected receiver locations using input parameter estimates such as total noise generated by each noise source; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures. The model outputs can be developed as noise level contour maps or noise levels at specific receivers. In all cases, receivers were modeled at 5 feet above ground elevation, which represents the average height of the human ear.

4.1 Construction Noise Analysis

Project construction noise would be generated by diesel engine-driven construction equipment used for site preparation and grading, material loading and unloading, building construction, and paving. Diesel engine-driven trucks also would bring materials to the site and remove the soils from excavation.

Construction equipment with a diesel engine typically generates maximum noise levels from 80 to 90 dB(A) L_{eq} at a distance of 50 feet (FTA 2006). Table 6 summarizes typical construction equipment noise levels.

Table 6
Typical Construction Equipment Noise Levels

Equipment	Noise Level at 50 Feet [dB(A) L_{eq}][1]	Typical Duty Cycle[2]
Air Compressor	80	40%
Backhoe	80	40%
Compactor	80	20%
Concrete Mixer	85	40%
Crane	85	20%
Dozer	85	40%
Excavator	85	40%
Grader	85	40%
Jack Hammer	85	20%
Loader	80	40%
Paver	85	50%
Pump	77	50%
Roller	74	40%
Scraper	85	40%
Truck	84	40%

SOURCE: FTA 2006.
[1]Noise levels based on those specified in Federal Highway Administration Road Construction Noise Model (2006).
[2]Amount of time equipment operates at full power.

During excavation, grading, and paving operations, equipment moves to different locations and goes through varying load cycles, and there are breaks for the operators and for non-equipment tasks, such as measurement. Although maximum noise levels may be 85 to 90 dB(A) at a distance of 50 feet during most construction activities, hourly average noise levels would be lower when taking into account the equipment usage factors. For the project, the loudest phase of construction would be the excavation phase. For this analysis, the simultaneous operation of a grader, dozer, loader, excavator, and dump truck was modeled. Simultaneous operation of this equipment would generate an average hourly noise level of 87 dB(A) L_{eq} at 50 feet from the center of construction activity.

4.2 Traffic Noise Analysis

The SoundPLAN program (Navcon Engineering 2018) uses the Federal Highway Administration's Traffic Noise Model algorithms and reference levels to calculate noise levels at selected receiver locations. The model uses various input parameters, such as projected traffic volumes; vehicle classification mix, and speed; roadway lengths and gradients; distances between sources, barriers, and receivers; and shielding provided by intervening terrain, barriers, and structures.

The main source of traffic noise at the project site is vehicle traffic on I-805, SR-54, freeway ramps (I-805 northbound to SR-54 eastbound and SR-54 westbound to I-805 southbound), Sweetwater Road, and Plaza Bonita Road. For the purpose of traffic noise compatibility analysis, the noisiest condition corresponds to the maximum level of service (LOS) C/minimum LOS D traffic volume for Sweetwater Road and Plaza Bonita Road, and a maximum LOS C/minimum LOS D rate of 1,900 vehicles per hour per lane for the freeways and ramps. The maximum LOS C/minimum LOS D volumes represent a condition where the maximum number of vehicles are using the roadway at the maximum speed. LOS A and B categories allow full travel speed but do not have as many vehicles, while LOS D, E, and F have a greater number of vehicles, but due to the traffic volume travel at reduced speeds, generate less noise.

Sweetwater Road and Plaza Bonita Road are classified as 4-lane arterials with a maximum capacity of 40,000 vehicles and a maximum LOS C/minimum LOS D capacity of 30,000 vehicles (City of National City 2011). In the vicinity of the project site, I-805 is a 12-lane freeway, SR-54 is a 6-lane freeway, the ramp from I-805 northbound to SR-54 eastbound is a 2-lane ramp, and the ramp from SR-54 westbound to I-805 southbound is a 2-lane ramp. Based on a maximum LOS C/minimum LOS D rate of 1,900 vehicles per hour per lane, the loudest hourly volumes for I-805, SR-54, and each of the ramps would be 22,800, 11,400, and 3,800 vehicles per hour, respectively.

Traffic noise levels are calculated based on peak-hour traffic volumes. Caltrans traffic counts conducted along the freeway segments adjacent to the project site show that the peak hour volume is approximately 8 percent of the average daily traffic (ADT) volume (Caltrans 2017). Based on the traffic count data for Sweetwater Road and Plaza Bonita Road, the predicted CNEL is within 1 dB(A) of the peak-hourly L_{eq} calculated.

Vehicle classification mixes for I-805 and SR-54 were obtained from Caltrans truck counts. The vehicle classification mix for I-805 is 93.8 percent automobiles, 3.9 percent medium trucks, and 2.3 percent heavy trucks, and the vehicle classification mix for SR-54 is 97.4 percent automobiles, 2.4 percent medium trucks, and 0.2 percent heavy trucks (Caltrans 2018). Caltrans does not include counts for motorcycles or buses. To include these in the calculation, 1 percent of the automobiles were modeled as motorcycles and 1 percent as buses. The same vehicle classification mix used to model SR-54 was also used to model Sweetwater Road, Plaza Bonita Road, and the ramps.

Table 7 summarizes the future vehicle traffic modeling parameters.

Table 7
Future Vehicle Traffic Modeling Parameters

Roadway Segment	LOS C ADT	LOS C Peak Hour Volume	Speed (mph)	Vehicle Classification Mix				
				Autos	Medium Trucks	Heavy Trucks	Buses	Motor-cycles
I-805	--	22,800	65	91.8	3.9	2.3	1.0	1.0
SR-54	--	11,400	65	95.4	2.4	0.2	1.0	1.0
Ramp – I-805 NB to SR-54 EB	--	3,800	50	95.4	2.4	0.2	1.0	1.0
Ramp – SR-54 WB to I-805 SB	--	3,800	50	95.4	2.4	0.2	1.0	1.0
Sweetwater Road	30,000	2,700	45	95.4	2.4	0.2	1.0	1.0
Plaza Bonita Road	30,000	2,700	45	95.4	2.4	0.2	1.0	1.0

LOS = level of service; ADT = average daily traffic ; mph = miles per hour; NB = northbound; SB = southbound; EB = eastbound; WB = westbound

4.3 On-Site Generated Noise Analysis

Noise sources associated with project operation would include rooftop heating, ventilation, and air conditioning (HVAC) units, as well as a blower, vacuum, and air compressor at the proposed carwash. HVAC equipment was modeled on the rooftop of the proposed buildings. It is not known at this time which manufacturer, brand, or model of unit or units will be selected for use in the project. Typically, a capacity of 1 ton per 340 square feet would be required for large office buildings. This ratio was used to determine the total HVAC capacity required for the project. The main 17,844-square-foot facility would include HVAC units; the 930-square-foot carwash would not utilize an HVAC unit. Based on this ratio, the 17,844-square-foot facility would require a worst case capacity of approximately 52.5 tons. A total of six 10-ton units were modeled. Based on review of manufacturer specifications for a sample unit (Trane Model T/YSCE120ED), a representative noise level for a 10-ton unit would be a sound power level of 79 dB(A) L_{pw}. Noise specifications are contained in Attachment 2. All units were modeled at full capacity.

The main noise sources associated with the proposed carwash would include the carwash tunnel blower, a vacuum, and an air compressor. Based on noise measurement information provided for a similar carwash, a standard configuration of four blowers would be anticipated to generate a sound power level of 98.9 dB(A) L_{pw} (RECON 2018). This noise level was modeled at the exit of the proposed carwash. Carwash vacuums would have a sound power level of 74.1 dB(A) L_{eq} (MD Acoustics 2016). A vacuum was modeled adjacent

to the proposed carwash building. Lastly, as shown in Table 6, air compressors generate a maximum noise level of 80 dB(A) at 50 feet. Assuming the consistent use of an air compressor for five minutes of an hour, the sound power level would be 100.8 dB(A) L_{pw}. The air compressor was modeled adjacent to the carwash, next to the vacuum.

5.0 Future Acoustical Environment and Impacts

5.1 Construction Noise

Noise associated with the grading, building, and paving for the project would potentially result in short-term impacts to surrounding residential properties. There are residential uses located to the north and east of the project site. A variety of noise-generating equipment would be used during the construction phase of the project, such as excavators, backhoes, front-end loaders, and concrete saws, along with others. For this analysis, the simultaneous operation of a grader, dozer, loader, excavator, and dump truck was modeled. Simultaneous operation of this equipment would generate an average hourly noise level of 87 dB(A) L_{eq} at 50 feet from the center of construction activity.

Construction noise is considered a point source and would attenuate at approximately 6 dB(A) for every doubling of distance. To reflect the nature of grading and construction activities, equipment was modeled as an area source distributed over the project footprint. The total sound energy of the area source was modeled with all pieces of equipment operating simultaneously. Noise levels were modeled at a series of 12 receivers located at the adjacent commercial and residential uses. The results are summarized in Table 8. Modeled receiver locations and construction noise contours are shown in Figure 5. SoundPLAN data are contained in Attachment 3.

Table 8
Construction Noise Levels at Residential Uses

Receiver	Land Use	Noise Level [dB(A) L_{eq}]
1	Commercial	59
2	Residential	53
3	Residential	60
4	Residential	62
5	Residential	62
6	Residential	62
7	Residential	58
8	Residential	59
9	Residential	58
10	Residential	55
11	Commercial	65
12	Commercial	66

Image Source: Nearmap (flown May 2020)

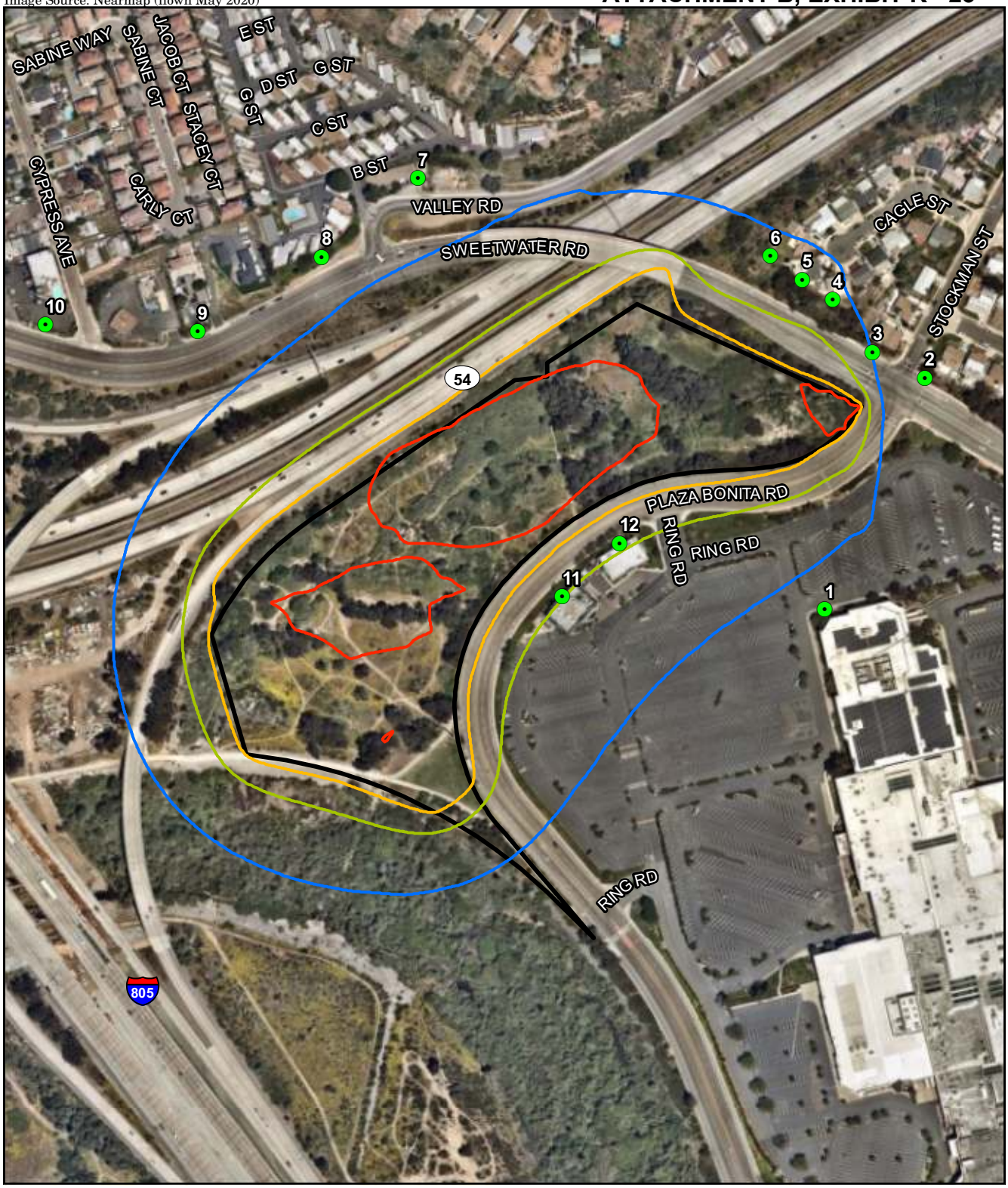

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FIGURE 5
Construction Noise Contours

As shown in Table 8, construction noise levels would range from 53 to 66 dB(A) L_{eq} at the adjacent uses. Construction activities would generally occur over the 8-hour period between 7:00 a.m. and 5:00 p.m. on weekdays. Although the existing adjacent uses would be exposed to construction noise levels that may be heard above ambient conditions, the exposure would be temporary and would not exceed the City's standards (see Table 3). Therefore, project construction would not exceed applicable noise level standards and impacts would be less than significant.

5.2 Traffic Noise

5.2.1 On-Site Traffic Noise

Traffic noise contours were developed using the SoundPLAN program. Noise level contours were modeled at the first-floor level. These contours take into account topography and shielding provided by the proposed buildings. Future vehicle traffic noise-level contours are shown in Figure 6. SoundPLAN data are presented in Attachment 4.

As discussed in Section 2.1 above, automotive and service commercial land uses are compatible with noise levels up to 70 CNEL and conditionally compatible with noise levels above 70 CNEL. As shown in Figure 6, exterior noise levels are projected to be 70 CNEL or less across a majority of the project site and less than 70 CNEL at the proposed buildings, which would be compatible with City standards. Exterior noise levels at the project boundaries immediately adjacent to SR-54 and Plaza Bonita Road would exceed 70 CNEL; however, parking lots would be constructed in these areas and noise levels would not interfere with outdoor activities. Therefore, on-site traffic noise would not result in a permanent increase in ambient noise in excess of applicable noise level standards, and impacts would be less than significant.

5.2.2 Off-Site Traffic Noise

The project would increase traffic volumes on local roadways. However, the project would not substantially alter the vehicle classifications mix on local or regional roadways, nor would the project alter the speed on an existing roadway or create a new roadway. Thus, the primary factor affecting off-site noise levels would be increased traffic volumes. While changes in noise levels would occur along any roadway where project-related traffic occurs, for noise assessment purposes, noise level increases are assumed to be greatest nearest the project site, as this location would represent the greatest concentration of project-related traffic. Additionally, surrounding streets affected by the project carry greater volumes of traffic and the relative increase would be less along those segments. The project would generate traffic on nearby roadways. Based on a trip rate of 50 trips per 1,000 square feet (SANDAG 2002), the 18,774-square-foot CarMax facility would generate 939 daily trips. The vehicles associated with these trips would utilize the surrounding roadway network including Plaza Bonita Road and Sweetwater Road.

Image Source: Nearmap (flown May 2020)

Parcel Boundary

Site Plan

Vehicle Traffic Noise Contours

60 CNEL

65 CNEL

70 CNEL

75 CNEL

0 Feet 300

FIGURE 6

Vehicle Traffic Noise Contours

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As discussed in Section 1.2 above, doubling of the energy of a noise source, such as traffic volumes on a roadway, would result in a 3 dB(A) increase in noise levels (Caltrans 2013). Studies have shown that the average human ear can barely perceive a change in sound level of 3 dB(A). A change of at least 5 dB(A) is considered a readily perceivable change in a normal environment. A 10 dB(A) increase is subjectively heard as a doubling in loudness and would cause a community response. Based on these concepts of perception, 3 dB(A) is conservatively considered a substantial increase in ambient traffic noise levels.

A 3 d(B) increase occurs when there is a doubling of traffic volumes. Traffic volumes on roadways in the vicinity of the project site are much greater than the 939 daily trips that would be generated by the18,774-square-foot CarMax facility (SANDAG 2020). Consequently, the addition of project traffic to area roadways would not result in a doubling of traffic volumes, and the resulting noise level increase would be less than 3 dB that would not be perceivable. Therefore, off-site traffic noise would not result in a permanent increase in ambient noise levels in excess of applicable noise level standards, and impacts would be less than significant.

5.3 On-Site Generated Noise

Noise sources associated with project operation would include rooftop HVAC units, as well as a blower, vacuum, and air compressor at the proposed carwash. Commercial uses are located south of the project site, single-family residential uses are located east and north of the project site, and a mobile home park is located north of the project site. As shown in Table 2 above, the applicable limits for low-density residential uses are 55 dB(A) L_{eq} between 7:00 a.m. and 10:00 p.m. and 45 dB(A) L_{eq} between 10:00 p.m. and 7:00 a.m.; the applicable limits for multi-unit residential are 60 dB(A) L_{eq} between 7:00 a.m. and 10:00 p.m. and 55 dB(A) L_{eq} between 10:00 p.m. and 7:00 a.m.; and the applicable limits for commercial uses are 65 dB(A) L_{eq} between 7:00 a.m. and 10:00 p.m. and 60 dB(A) L_{eq} between 10:00 p.m. and 7:00 a.m.

Using the on-site noise source parameters discussed in Section 4.3 above, On-Site Generated Noise Analysis, noise levels were modeled at a series of 12 receivers located at the adjacent property lines. Noise source and modeled receiver locations are shown in Figure 7. Future projected noise levels are summarized in Table 9. Modeled data are included in Attachment 5.

As shown in Table 9, on-site generated noise levels would range from 37 to 43 dB(A)$_{Leq}$ at the residential property lines and 41 to 47 dB(A) L_{eq} at the commercial property lines. These noise levels would not exceed the applicable daytime or nighttime noise limits in the Municipal Code. It should also be noted that the adjacent residential uses to the east are located more than 120 feet from the property line, and the residential uses to the north are located on the opposite side of SR-54. Noise due to on-site noise sources would likely not be audible over existing ambient noise levels due to vehicle traffic noise on the freeways and area roadways. Therefore, on-site generated noise would not result in a permanent increase in ambient noise levels in excess of applicable noise level standards, and impacts would be less than significant.

Image Source: Nearmap (flown May 2020)

Parcel Boundary
HVAC
Receivers
Site Plan

Carwash
Blower
Vacuum
Air Compressor

On-Site Contours
40 dB(A) Leq
45 dB(A) Leq
50 dB(A) Leq
55 dB(A) Leq
60 dB(A) Leq
65 dB(A) Leq
70 dB(A) Leq
75 dB(A) Leq

0 Feet 300

RECON

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FIGURE 7

On-Site Noise Contours

Table 9 On-Site Generated Noise Levels			
Receiver	Land Use	Applicable Limits Daytime/Nighttime [dB(A) L_{eq}]	Noise Level [dB(A) L_{eq}]
1	Commercial	65/60	41
2	Residential	55/45	37
3	Residential	55/45	38
4	Residential	55/45	38
5	Residential	55/45	38
6	Residential	55/45	37
7	Residential	60/50	40
8	Residential	60/50	42
9	Residential	60/50	43
10	Residential	60/50	38
11	Commercial	65/60	47
12	Commercial	65/60	43

6.0 Conclusions

6.1 Construction Noise

Construction activities would generally occur between 7:00 a.m. and 5:00 p.m. on weekdays. As demonstrated, construction noise levels would range from 53 to 66 dB(A) L_{eq} at the adjacent uses. While construction may be heard over other noise sources in the area, the exposure would be temporary and would not exceed the City's standards. Therefore, project construction would not exceed applicable noise level standards and impacts would be less than significant.

6.2 Traffic Noise

6.2.1 On-Site Traffic Noise

Automotive and service commercial land uses are compatible with noise levels up to 70 CNEL and conditionally compatible with noise levels above 70 CNEL. As demonstrated, exterior noise levels are projected to be 70 CNEL or less across a majority of the project site and less than 70 CNEL at the proposed buildings, and would be compatible with City standards. Exterior noise levels at the project boundaries immediately adjacent to SR-54 and Plaza Bonita would exceed 70 CNEL; however, parking lots would be constructed in this area and noise levels would not interfere with outdoor activities. Therefore, on-site traffic noise would not result in a permanent increase in ambient noise levels in excess of applicable noise level standards, and impacts would be less than significant.

6.2.2 Off-Site Traffic Noise

The addition of project traffic to area roadways would not result in a doubling of traffic volumes, and the resulting noise level increase would be less than 3 dB that would not be

perceivable. Therefore, off-site traffic noise would not result in a permanent increase in ambient noise levels in excess of applicable noise level standards, and impacts would be less than significant.

6.3 On-site Generated Noise

Noise sources associated with project operation would include rooftop HVAC units, as well as a blower, vacuum, and air compressor at the proposed carwash. On-site generated noise levels would range from 37 to 43 dB(A) L_{eq} at the residential property lines and 41 to 47 dB(A) L_{eq} at the commercial property lines. These noise levels would not exceed the applicable daytime and nighttime noise limits in the Municipal Code. The project is not anticipated to generate noise levels in excess of the noise level limits in the Municipal Code. It should also be noted that the adjacent residential uses to the east are located more than 120 feet from the property line, and the residential uses to the north are located on the opposite side of SR-54. Noise due to on-site noise sources would not be audible over existing ambient noise levels due to vehicle traffic noise on the freeways and area roadways. Therefore, on-site generated noise would not result in a permanent increase in ambient noise levels in excess of applicable noise level standards, and impacts would be less than significant.

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ATTACHMENTS

ATTACHMENT 1

Noise Measurement Data

7761 National City CarMax
Noise Measurements

Summary				
Filename	LxT_Data.046			
Serial Number	3828			
Model	SoundExpert™ LxT			
Firmware Version	2.301			
User				
Location				
Job Description				
Note				
Measurement Description				
Start	2016/08/09 10:49:59			
Stop	2016/08/09 11:05:00			
Duration	0:15:00.6			
Run Time	0:15:00.6			
Pause	0:00:00.0			
Pre Calibration	2016/08/09 10:49:16			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	At Lmax			
Overload	121.9 dB			
	A	**C**	**Z**	
Under Range Peak	**78.2**	75.2	80.2	dB
Under Range Limit	**26.1**	25.3	32.1	dB
Noise Floor	16.3	16.1	22.0	dB

Results				
LAeq	65.8	dB		
LAE	95.3	dB		
EA	378.648	µPa²h		
LApeak (max)	2016/08/09 10:52:11		93.3	dB
LASmax	2016/08/09 10:52:12		79.2	dB
LASmin	2016/08/09 10:59:17		58.2	dB
SEA	-99.9	dB		
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0	s
Community Noise	**Ldn**			
	65.8			
LCeq	76.6	dB		
LAeq	65.8	dB		
LCeq - LAeq	10.9	dB		
LAleq	67.0	dB		
LAeq	65.8	dB		
LAleq - LAeq	1.2	dB		
# Overloads	0			
Overload Duration	0.0	s		
# OBA Overloads	0			
OBA Overload Duration	0.0	s		
Statistics				
LAS5.00	70.4	dB		
LAS10.00	68.5	dB		
LAS33.30	65.3	dB		
LAS50.00	64.2	dB		
LAS66.60	63.0	dB		
LAS90.00	60.7	dB		

7761 National City CarMax
Noise Measurements

Summary				
Filename	LxT_Data.047			
Serial Number	3828			
Model	SoundExpert™ LxT			
Firmware Version	2.301			
User				
Location				
Job Description				
Note				
Measurement Description				
Start	2016/08/09 11:25:43			
Stop	2016/08/09 11:40:44			
Duration	0:15:00.4			
Run Time	0:15:00.4			
Pause	0:00:00.0			
Pre Calibration	2016/08/09 11:25:10			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	At Lmax			
Overload	121.8 dB			
	A	**C**	**Z**	
Under Range Peak	**78.0**	75.0	80.0	dB
Under Range Limit	**26.0**	25.2	32.0	dB
Noise Floor	16.3	16.1	22.0	dB

Results				
LAeq	64.6	dB		
LAE	94.2	dB		
EA	291.282	µPa²h		
LApeak (max)	2016/08/09 11:32:29		85.8	dB
LASmax	2016/08/09 11:30:24		67.9	dB
LASmin	2016/08/09 11:40:43		60.2	dB
SEA	-99.9	dB		
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0	s
Community Noise	**Ldn**			
	64.6			
LCeq	71.5	dB		
LAeq	64.6	dB		
LCeq - LAeq	6.9	dB		
LAleq	65.3	dB		
LAeq	64.6	dB		
LAleq - LAeq	0.7	dB		
# Overloads	0			
Overload Duration	0.0	s		
# OBA Overloads	0			
OBA Overload Duration	0.0	s		
Statistics				
LAS5.00	66.2	dB		
LAS10.00	65.9	dB		
LAS33.30	65.1	dB		
LAS50.00	64.6	dB		
LAS66.60	64.0	dB		
LAS90.00	62.9	dB		

7761 National City CarMax
Noise Measurements

Summary				
Filename	LxT_Data.048			
Serial Number	3828			
Model	SoundExpert™ LxT			
Firmware Version	2.301			
User				
Location				
Job Description				
Note				
Measurement Description				
Start	2016/08/09 11:52:41			
Stop	2016/08/09 12:07:41			
Duration	0:15:00.4			
Run Time	0:15:00.4			
Pause	0:00:00.0			
Pre Calibration	2016/08/09 11:52:01			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	At Lmax			
Overload	121.7 dB			
	A	**C**	**Z**	
Under Range Peak	**78.0**	75.0	80.0	dB
Under Range Limit	**26.0**	25.2	32.0	dB
Noise Floor	16.2	16.1	22.0	dB

Results				
LAeq	66.0 dB			
LAE	95.5 dB			
EA	396.724 µPa²h			
LApeak (max)	2016/08/09 11:56:52		103.2	dB
LASmax	2016/08/09 12:06:21		75.0	dB
LASmin	2016/08/09 12:00:48		60.6	dB
SEA	-99.9 dB			
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0	s
Community Noise	**Ldn**			
	66.0			
LCeq	73.5 dB			
LAeq	66.0 dB			
LCeq - LAeq	7.5 dB			
LAleq	67.3 dB			
LAeq	66.0 dB			
LAleq - LAeq	1.3 dB			
# Overloads	0			
Overload Duration	0.0 s			
# OBA Overloads	0			
OBA Overload Duration	0.0 s			
Statistics				
LAS5.00	68.5 dB			
LAS10.00	67.9 dB			
LAS33.30	66.1 dB			
LAS50.00	65.5 dB			
LAS66.60	64.8 dB			
LAS90.00	63.6 dB			

7761 National City CarMax
Noise Measurements

Summary				
Filename	LxT_Data.050			
Serial Number	3828			
Model	SoundExpert™ LxT			
Firmware Version	2.301			
User				
Location				
Job Description				
Note				
Measurement Description				
Start	2016/08/09 12:31:42			
Stop	2016/08/09 12:46:42			
Duration	0:15:00.3			
Run Time	0:15:00.3			
Pause	0:00:00.0			
Pre Calibration	2016/08/09 12:31:31			
Post Calibration	None			
Calibration Deviation	---			
Overall Settings				
RMS Weight	A Weighting			
Peak Weight	A Weighting			
Detector	Slow			
Preamp	PRMLxT1L			
Microphone Correction	Off			
Integration Method	Linear			
OBA Range	Normal			
OBA Bandwidth	1/1 and 1/3			
OBA Freq. Weighting	A Weighting			
OBA Max Spectrum	At Lmax			
Overload	121.8 dB			
	A	**C**	**Z**	
Under Range Peak	**78.1**	75.1	80.1	dB
Under Range Limit	**26.0**	25.2	32.0	dB
Noise Floor	16.3	16.1	22.0	dB

Results				
LAeq	73.0	dB		
LAE	102.5	dB		
EA	1.986	mPa²h		
LApeak (max)	2016/08/09 12:33:56		96.0	dB
LASmax	2016/08/09 12:31:42		80.2	dB
LASmin	2016/08/09 12:39:01		67.5	dB
SEA	-99.9	dB		
LAS > 85.0 dB (Exceedence Counts / Duration)	0		0.0	s
LAS > 115.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 135.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 137.0 dB (Exceedence Counts / Duration)	0		0.0	s
LApeak > 140.0 dB (Exceedence Counts / Duration)	0		0.0	s
Community Noise	**Ldn**			
	73.0			
LCeq	77.0	dB		
LAeq	73.0	dB		
LCeq - LAeq	4.0	dB		
LAleq	73.7	dB		
LAeq	73.0	dB		
LAleq - LAeq	0.8	dB		
# Overloads	0			
Overload Duration	0.0	s		
# OBA Overloads	0			
OBA Overload Duration	0.0	s		
Statistics				
LAS5.00	75.0	dB		
LAS10.00	74.6	dB		
LAS33.30	73.4	dB		
LAS50.00	72.8	dB		
LAS66.60	72.1	dB		
LAS90.00	70.7	dB		

ATTACHMENT 2

HVAC Example Specifications

TRANE

Fan Performance

Table 6. Standard motor & low static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
5	WSC060ED	AK44x3/4"	N/A	720	791	861	931	1002	1072
6	WSC072ED	AK56x1"	N/A	558	612	665	718	772	825
7½	WSC090ED	AK57x1"	N/A	688	737	787	837	887	N/A
10	WSC120ED	AK105X1"	N/A	724	776	828	880	932	984

Note: Factory set at 3 turns open.

Table 7. Standard motor & high static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
6	WSC072ED	AK56x1"	N/A	968	1018	1068	1118	1169	1219
7½	WSC090ED	AK57x1"	1053	1091	1129	1166	1204	1242	N/A
10	WSC120ED	AK105X1"	1110	1159	1209	1258	1308	1357	N/A

Note: Factory set at 3 turns open.

Table 8. Oversized motor & high static drive accessory sheave/fan speed (rpm)

Tons	Unit Model Number	Fan Sheave	6 Turns Open	5 Turns Open	4 Turns Open	3 Turns Open	2 Turns Open	1 Turn Open	Closed
7½	WSC090ED	AK85x1"	1186	1249	1311	1373	1436	N/A	N/A

Note: Factory set at 3 turns open.

Table 9. Outdoor sound power level—dB (ref. 10—2 W)

Tons	Unit Model Number	Octave Center Frequency								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5	T/YSC060ED	84	91	79	77	74	71	68	63	80
6	T/YSC072ED	83	90	86	82	79	75	70	63	85
7½	T/YSC090ED	83	90	86	83	80	75	71	64	85
8.5	T/YSC102ED	83	89	84	81	77	72	69	62	83
10	T/YSC120ED	83	86	80	77	73	69	66	60	79

Note: Tests follow ARI270-95.

Table 10. Outdoor sound power level—dB (ref. 10—12 W)

Tons	Unit Model Number	Octave Center Frequency								Overall dBA
		63	125	250	500	1000	2000	4000	8000	
5	WSC060ED	84	91	79	77	74	71	68	63	80
6	WSC072ED	83	90	86	82	79	75	70	63	85
7½	WSC090ED	83	90	86	83	80	75	71	64	85
10	WSC120ED	83	86	80	77	73	69	66	60	79

Note: Tests follow ARI270-95.

ATTACHMENT 3

SoundPLAN Data – Construction Noise

Source name	Reference	Level Leq1 dB(A)	Corrections Kwall dB(A)	CI dB(A)	CT dB(A)
Construction Area	Unit	118.6	-	-	-

Receiver	Coordinates X	Coordinates Y	Height	Noise Level Leq1
	in meters		m	dB(A)
1	493732.54	3613412.84	10.64	58.5
2	493801.57	3613575.57	17.62	53.2
3	493764.85	3613593.75	23.99	59.7
4	493736.60	3613630.03	27.82	61.7
5	493714.94	3613644.10	24.81	62.2
6	493692.50	3613660.58	17.73	61.5
7	493445.47	3613713.15	20.23	58.2
8	493378.00	3613657.58	17.49	58.7
9	493292.01	3613604.67	13.90	58.1
10	493184.86	3613608.64	16.22	55.1
11	493548.80	3613420.78	9.42	65.1
12	493588.48	3613458.35	10.64	65.6

ATTACHMENT 4

SoundPLAN Data – Vehicle Traffic Noise

7761 National City CarMax
SoundPLAN Data - Vehicle Traffic

Station km	ADT Veh/24h	Traffic values Vehicles type	Vehicle na day Veh/h	Speed km/h	Control device	Constr. Speed km/h	Affect. veh. %	Road surface	Gradient Min / Max %
Sweetwater Road WB Traffic direction: In entry direction									
0+233	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-0.7625
0+233	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.7625
0+520	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-1.6
0+520	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-1.6
1+375	-	-	-	-	-				
Sweetwater Road EB Traffic direction: In entry direction									
0+233	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-0.75
0+233	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.75
1+084	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+084	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.893333333
1+377	-	-	-	-	-				
Plaza Bonita Road NB Traffic direction: In entry direction									
0+233	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-2.216216216
0+233	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-2.216216216
1+241	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+241	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.222222222
1+450	-	-	-	-	-				
Plaza Bonita Road SB Traffic direction: In entry direction									
0+233	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+233	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-3.217391304
0+441	28800	Total	1200	-	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Automobiles	1144	72	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Medium trucks	29	72	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Heavy trucks	3	72	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Buses	12	72	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Motorcycles	12	72	none	-	-	Average (of DGAC and PCC)	-0.422680412
0+441	28800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.422680412
1+460	-	-	-	-	-				
I-805 SB Traffic direction: In entry direction									
0+233	273600	Total	11400	-	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Automobiles	10465	105	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Medium trucks	445	105	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Heavy trucks	262	105	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Buses	114	105	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Motorcycles	114	150	none	-	-	Average (of DGAC and PCC)	-0.772727273
0+233	273600	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.772727273
2+642	-	-	-	-	-				
I-805 NB Traffic direction: In entry direction									
0+233	273600	Total	11400	-	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Automobiles	10465	105	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Medium trucks	445	105	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Heavy trucks	262	105	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Buses	114	105	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Motorcycles	114	105	none	-	-	Average (of DGAC and PCC)	-1.230769231
0+233	273600	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-1.230769231
2+620	-	-	-	-	-				
SR-54 EB Traffic direction: In entry direction									
0+233	136800	Total	5700	-	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Automobiles	5438	105	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Medium trucks	135	105	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Heavy trucks	13	105	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Buses	57	105	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Motorcycles	57	105	none	-	-	Average (of DGAC and PCC)	-0.1125
0+233	136800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.1125
2+290	-	-	-	-	-				
SR-54 WB Traffic direction: In entry direction									
0+233	136800	Total	5700	-	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Automobiles	5438	105	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Medium trucks	137	105	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Heavy trucks	11	105	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Buses	57	105	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Motorcycles	57	105	none	-	-	Average (of DGAC and PCC)	-5.615384615
0+233	136800	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-5.615384615
2+296	-	-	-	-	-				
Ramp - I-805 NB to SR-54 EB Traffic direction: In entry direction									
0+233	91200	Total	3800	-	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Automobiles	3625	80	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Medium trucks	90	80	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Heavy trucks	9	80	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Buses	38	80	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Motorcycles	38	80	none	-	-	Average (of DGAC and PCC)	-0.333333333
0+233	91200	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.333333333
1+077	-	-	-	-	-				
Ramp - SR-54 WB to I-805 SB Traffic direction: In entry direction									
0+233	91200	Total	3800	-	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Automobiles	3625	80	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Medium trucks	90	80	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Heavy trucks	9	80	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Buses	38	80	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Motorcycles	38	80	none	-	-	Average (of DGAC and PCC)	-0.558139535
0+233	91200	Auxiliary vehicle	-	-	none	-	-	Average (of DGAC and PCC)	-0.558139535
1+404	-	-	-	-	-				

ATTACHMENT 5

SoundPLAN Data – On-Site Generated Noise

Source name	Reference	Level Leq1 dB(A)	Corrections Cwall dB(A)	CI dB(A)	CT dB(A)
HVAC	Lw/unit	83.8	-	-	-
HVAC	Lw/unit	83.8	-	-	-
Blower	Lw/unit	98.9	-	-	-
Vacuum	Lw/unit	74.1	-	-	-
Air Compressor	Lw/unit	100.8	-	-	-

Receiver No.	Coordinates X	Y	Height	Noise Level Leq1
	in meters		m	dB(A)
1	493732.54	3613412.84	10.74	40.7
2	493801.57	3613575.57	16.54	37.4
3	493764.85	3613593.75	18.15	38.0
4	493736.60	3613630.03	26.24	38.3
5	493714.94	3613644.10	25.54	38.4
6	493692.50	3613660.58	21.28	37.2
7	493445.47	3613713.15	20.23	39.5
8	493378.00	3613657.58	17.49	41.5
9	493292.01	3613604.67	13.90	42.8
10	493184.86	3613608.64	16.22	38.3
11	493548.80	3613420.78	13.08	47.1
12	493588.48	3613458.35	13.07	43.0

7761 National City CarMax
SoundPLAN Data - On-Site Noise

Source name				Noise Level Leq1 dB(A)
1	1.Fl	40.7	0.0	
Air Compressor				38.4
Blower				36.6
HVAC				21.6
HVAC				20.5
Vacuum				11.7
2	1.Fl	37.4	0.0	
Air Compressor				35.8
Blower				31.7
HVAC				19.1
HVAC				17.9
Vacuum				9.2
3	1.Fl	38.0	0.0	
Air Compressor				36.5
Blower				32.1
HVAC				19.9
HVAC				18.6
Vacuum				9.8
4	1.Fl	38.3	0.0	
Air Compressor				36.6
Blower				32.8
HVAC				20.6
HVAC				19.3
Vacuum				9.9
5	1.Fl	38.4	0.0	
Air Compressor				36.9
Blower				32.5
HVAC				20.8
HVAC				19.5
Vacuum				10.2
6	1.Fl	37.2	0.0	
Air Compressor				34.8
Blower				33.0
HVAC				20.8
HVAC				19.5
Vacuum				10.6
7	1.Fl	39.5	0.0	
Air Compressor				37.1
Blower				35.4
HVAC				22.3
HVAC				21.4
Vacuum				10.3
8	1.Fl	41.5	0.0	
Air Compressor				39.0
Blower				37.4
HVAC				23.6
HVAC				23.0
Vacuum				12.3
9	1.Fl	42.8	0.0	
Air Compressor				36.6
Blower				41.4
HVAC				23.3
HVAC				23.5
Vacuum				7.4
10	1.Fl	38.3	0.0	
Air Compressor				31.4
Blower				37.1
HVAC				20.6
HVAC				21.2
Vacuum				3.6
11	1.Fl	47.1	0.0	
Air Compressor				44.7
Blower				42.9
HVAC				31.4
HVAC				29.3
Vacuum				18.0
12	1.Fl	43.0	0.0	
Air Compressor				41.0
Blower				37.8
HVAC				28.4
HVAC				26.3
Vacuum				14.9

Contributions