

Exhibit K

**ACOUSTICAL ANALYSIS**

**TENTATIVE TRACT 5224  
OUTLOTS A & C  
FRESNO, CALIFORNIA**

**WJVA Project No. 24-62**

**PREPARED FOR**

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## INTRODUCTION

### **Outlot A:**

The proposed Tentative Parcel Map (PM) would allow the applicant, De Young Properties, to develop Outlot A as identified in Tract 5224 in Northwest Fresno. The project is considered an infill project. The proposed PM intends to create residential lots and the appurtenant infrastructure consistent with the General Plan designation of Medium Low Density Residential and proposed Zoning designation of RS-4 (Residential Single-Family, Medium Density), respectively. Future development of single-family homes will be consistent with these designations and would be evaluated by the city through the subsequent building permit submittal.

As proposed, the PM proposes to subdivide an approximate 0.71-acre parcel (APN: 505-220-58) into three lots, which is approximately 4.23 dwelling units per gross acre. The PM proposes primary access to N. Bryan Avenue. The project is located within the West Community Plan and is not within an adopted Specific Plan. Although, this project will be within the West Area Neighborhoods Specific Plan, if the plan is ever adopted. The project site is relatively flat with minor variations in elevation of two feet. Once developed, the project will drain to the south into existing storm drain facilities located within the N. Bryan Avenue right-of-way (ROW). According to the Fresno Metropolitan Flood Control District, there are inlets within the adjacent ROW that will serve the project site and feed into Basin "EM".

### **Outlot C:**

The proposed Tentative Subdivision Map (TSM) would allow the applicant, De Young Properties, to develop a temporary storm drain basin implemented as a part of Tract 5224 in Northwest Fresno. The project is considered an infill project. As a result of the full-build out of Veteran's Boulevard and the development of Basin "EM", the temporary storm drain basin is not needed. The storm drain basin was designed with the intention of being converted into future single family residential parcels. The proposed TSM intends to create residential lots and the appurtenant infrastructure consistent with the General Plan designation of Medium Density Residential and proposed Zoning designation of RS-4 (Residential Single-Family, Medium Density), respectively. Future development of single-family homes will be consistent with these designations and would be evaluated by the city through the subsequent building permit submittal.

As proposed, the TSM proposes to subdivide an approximate 1.4-acre parcel (APN: 505-220-60) into six lots, which is approximately 4.23 dwelling units per gross acre. The TSM proposes primary access to W. Barstow Avenue. The project is located within the West Community Plan Area and is not within a Specific Plan Area. Although, this project will be within the West Area Neighborhoods Specific Plan, if the plans is adopted. The project site is relatively flat with minor variations in elevation of two feet. Once developed, the project will drain to the north into existing storm drain facilities located within the W. Barstow Avenue right-of-way (ROW). According to the Fresno Metropolitan Flood Control District, there are inlets within the adjacent ROW that will serve the project site and feed into Basin "EM".

This analysis, prepared by WJV Acoustics, Inc. (WJVA), is based upon project site plans provided by the project applicant, traffic data provided by the Fresno Council of Governments (Fresno COG) and the findings of on-site noise level measurements. Revisions to the site plan may affect the findings and recommendations of this report. The Outlot A site plan is provided as Figure 1 and Outlot C site plan is provided as Figure 2.

Appendix A provides a description of the acoustical terminology used in this report. Unless otherwise stated, all sound levels reported are in A-weighted decibels (dB). A-weighting de-emphasizes the very low and very high frequencies of sound in a manner similar to the human ear. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects. Appendix B provides typical A-weighted sound levels for common noise sources.

In terms of human perception, a 5 dB increase or decrease is considered to be a noticeable change in noise levels. Additionally, a 10 dB increase or decrease is perceived by the human ear as half as loud or twice as loud. In terms of perception, generally speaking the human ear cannot perceive an increase (or decrease) in noise levels less than 3 dB.

## NOISE EXPOSURE CRITERIA

The City of Fresno General Plan Noise Element (adopted 12/18/14) provides noise level criteria for land use compatibility for both transportation and non-transportation noise sources. The General Plan sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level ( $L_{dn}$ ). The  $L_{dn}$  represents the time-weighted energy average noise level for a 24-hour day, with a 10 dB penalty added to noise levels occurring during the nighttime hours (10:00 p.m.-7:00 a.m.). The  $L_{dn}$  represents cumulative exposure to noise over an extended period of time and are therefore calculated based upon *annual average* conditions. Table I provides the General Plan noise level standards for transportation noise sources.

TABLE I CITY OF FRESNO GENERAL PLAN NOISE LEVEL STANDARDS TRANSPORTATION (NON-AIRCRAFT) NOISE SOURCES			
Noise-Sensitive Land Use	Outdoor Activity Areas <sup>1</sup>	Interior Spaces	
	$L_{dn}$ /CNEL, dB	$L_{dn}$ /CNEL, dB	$L_{eq}$ dB <sup>2</sup>
Residential	65	45	---
Transient Lodging	65	45	---
Hospitals, Nursing Homes	65	45	---
Theaters, Auditoriums, Music Halls	---	---	35
Churches, Meeting Halls	65	---	45
Office Buildings	---	---	45
Schools, Libraries, Museums	---	---	45

<sup>1</sup> Where the location of the outdoor activity areas is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use.  
<sup>2</sup> As determined for a typical worst-case hour during periods of use.

Source: City of Fresno General Plan

Additionally, Implementing Policy NS-1-h of the noise element requires that interior noise levels attributable to exterior transportation noise sources not exceed 45 dB  $L_{dn}$ . The intent of the interior noise level standard is to provide an acceptable noise environment for indoor communication and sleep.

It should be noted, according to the City of Fresno, the project site includes previously established “Conditions of Zoning” requirements that must be met. This includes an exterior maximum noise level of 60 dB  $L_{dn}$ .

## PROJECT SITE NOISE EXPOSURE

The project site is located at the northern point (Outlot A) and the southern point (Outlot C) of the intersection of N. Veterans Boulevard and N. Bryan Avenue/W. Barstow Avenue, within the City of Fresno, California. The project site is exposed traffic noise associated with vehicles on these roadways. The approximate distance from the roadway centerlines to center of the backyards of the closest proposed lots to each roadway is as follows:

- N. Veterans Boulevard: 120 feet
- N. Bryan Avenue: 70 feet
- W. Barstow Avenue: 75 feet

### Exterior Noise Exposure

Noise exposure from traffic on N. Veterans Boulevard and N. Bryan Avenue/W. Barstow Avenue was calculated for existing and future (2046) conditions using the FHWA Traffic Noise Model and traffic data obtained from Fresno COG.

WJVA utilized the Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108). The FHWA Model is a standard analytical method used for roadway traffic noise calculations. The model is based upon reference energy emission levels for automobiles, medium trucks (2 axles) and heavy trucks (3 or more axles), with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the site. The FHWA Model was developed to predict hourly  $L_{eq}$  values for free-flowing traffic conditions, and is generally considered to be accurate within  $\pm 1.5$  dB. To predict  $L_{dn}$  values, it is necessary to determine the hourly distribution of traffic for a typical day and adjust the traffic volume input data to yield an equivalent hourly traffic volume.

Noise level measurements and concurrent traffic counts were conducted by WJVA staff at three (3) locations within the project site on November 18, 2024. The purpose of the measurements was to evaluate the accuracy of the FHWA Model in describing traffic noise exposure within the project site. One traffic noise measurement site was located approximately 40 feet from the centerline N. Bryan Avenue, one traffic noise measurement site was located approximately 50 feet from the centerline of W. Barstow Avenue, and one traffic noise measurement site was located approximately 80 feet from the centerline of Veterans Boulevard. The speed limits posted in the project vicinity was 45 mph (miles per hour) along Veterans Boulevard and 40 mph along N. Bryan Avenue/W. Barstow Avenue. The project vicinity and noise monitoring site locations are provided as Figure 3. Photographs showing the Veterans Boulevard, N. Bryan Avenue and W. Barstow Avenue noise measurement sites are provided as Figure 4, Figure 5, and Figure 6, respectively.

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL-820 sound level analyzer equipped with a B&K Type 4176 1/2" microphone. The equipment complies with the specifications of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters. The meter was calibrated in the field prior to use with a B&K Type 4230 acoustic

calibrator to ensure the accuracy of the measurements. The microphone was located on a tripod at 5 feet above the ground. The project site presently consists of undeveloped land and a portion is currently used for industrial purposes.

Noise measurements were conducted in terms of the equivalent energy sound level ( $L_{eq}$ ). Measured  $L_{eq}$  values were compared to  $L_{eq}$  values calculated (predicted) by the FHWA Model using as inputs the traffic volumes, truck mix and vehicle speed observed during the noise measurements. The results of the comparison are shown in Table II.

From Table II it may be determined that the traffic noise levels predicted by the FHWA Model were within 0.2 dB and 1.4 of those measured for the conditions observed at the time of the noise measurements. This is considered to be reasonable agreement with the model and therefore no adjustments to the model are necessary.

TABLE II COMPARISON OF MEASURED AND PREDICTED (FHWA MODEL) NOISE LEVELS TENTATIVE TRACT 5224, OUTLOTS A & C, FRESNO			
	N. Veterans Blvd	N. Bryan Ave	W. Barstow Ave
Measurement Start Time	10:45 a.m.	11:10 a.m.	11:35 a.m.
Observed # Autos/Hr.	1,276	160	336
Observed # Medium Trucks/Hr.	20	4	8
Observed # Heavy Trucks/Hr.	12	0	0
Observed Speed (MPH)	45	40	40
Distance, ft. (from center of roadway)	80	40	50
$L_{eq}$ , dBA (Measured)	65.1	60.0	63.1
$L_{eq}$ , dBA (Predicted)	65.3	59.1	61.7
<b>Difference between Predicted and Measured <math>L_{eq}</math>, dBA</b>	<b>0.2</b>	<b>0.9</b>	<b>1.4</b>

Note: FHWA "soft" site assumed for calculations.  
Source: WJV Acoustics, Inc.

Annual Average Daily Traffic (AADT) data for N. Veterans Boulevard, N. Bryan Avenue, and W. Barstow Avenue, in the project vicinity was obtained from Fresno COG. Truck percentages and the day/night distribution of traffic were estimated by WJVA, based upon previous studies conducted in the project vicinity since project-specific data were not available from government sources. Table III summarizes annual average traffic data used to model noise exposure within the project site.

**TABLE III**  
**TRAFFIC NOISE MODELING ASSUMPTIONS**  
**TENTATIVE TRACT 5224, OUTLOTS A & C, FRESNO**

	N. Veterans Blvd		N. Bryan Ave		W. Barstow Ave	
	Existing	2046	Existing	2046	Existing	2046
Annual Avenue Daily Traffic (AADT)	21,018	19,589	5,426	5,131	5,146	9,342
Day/Night Split (%)	90/10					
Assumed Vehicle Speed (mph)	45		40		40	
% Medium Trucks (% AADT)	2					
% Heavy Trucks (% AADT)	1					
Sources: Fresno COG WJV Acoustics, Inc.						

Using data from Table III, the FHWA Model, annual average traffic noise exposure was calculated for the proposed residential lots. The calculated noise exposure for each proposed residential lot adjacent to a roadway is summarized in Table IV, for existing and future (2046) traffic conditions.

**TABLE IV**  
**MODELED TRAFFIC NOISE LEVELS, dB, CNEL**  
**TENTATIVE TRACT 5224, OUTLOTS A & C, FRESNO**

Lot	Existing Conditions	2046 Conditions
Outlot A – Lot A	64	64
Outlot A – Lot B	64	64
Outlot A – Lot C	65	65
Outlot C – Lot 1	65	66
Outlot C – Lot 2	64	64
Outlot C – Lot 3	64	64
Outlot C – Lot 4	64	64
Outlot C – Lot 5	56	58
Outlot C – Lot 6	60	62
Source: WJV Acoustics Fresno COG		

From Table IV it can be determined that project site noise exposure at the proposed residential lots is generally in the range of approximately 64 to 66 dB L<sub>dn</sub>, with the exception of Outlot C Lot 5 and Lot 6, where the existing and future noise exposure was calculated to be in the range of approximately 56 dB L<sub>dn</sub> and 62 dB L<sub>dn</sub>.

There is an existing 6-foot concrete block wall along the N. Veterans Boulevard roadway frontage at Outlot A. Additionally, the site plan indicates that there will be a 6-foot concrete block wall constructed around the Outlot C residential lots. Both the existing block wall at Outlot A and the proposed block wall at Outlot C will provide traffic noise attenuation within the proposed



residential lots. The sound walls will provide acoustical shielding of backyards located adjacent to the roadways.

A sound wall insertion loss program based on the FHWA Model was used to calculate the insertion loss (noise reduction) provided by the existing and proposed sound walls. The model calculates the insertion loss of a wall of given height based on the effective height of the noise source, height of the receiver, distance from the receiver to the wall, and distance from the noise source to the wall. The standard assumptions used in the sound wall calculations are effective source heights of 8, 2 and 0 feet above the roadway for heavy trucks, medium trucks, and automobiles, respectively. The standard height of a residential receiver is five feet above the ground elevation.

Based upon the above-described assumptions and method of analysis, the noise level insertion loss values for the sound walls were calculated. The calculations indicate that the existing (Outlot A) and proposed (Outlot C) 6-foot sound walls would provide approximately 5 dB of traffic noise attenuation within the individual backyards. With the attenuation provided by the sound walls, the exterior noise exposure at the proposed residential lots (excluding Outlot C Lot 1) would be in the range of approximately 53 to 60 dB  $L_{dn}$ . Such levels do not exceed the City of Fresno exterior noise level standard of 65 dB  $L_{dn}$  or the applicable Conditions of Zoning standard of 60 dB  $L_{dn}$ , as applied to the project site.

The above-described sound wall insertion loss calculations also indicated that a sound wall constructed to a minimum height of 7-feet above project site elevation would be required to comply with the 60 dB  $L_{dn}$  conditions of zoning at Outlot C, Lot 1. The portion of the wall that must be constructed to a minimum height of 7-feet should extend approximately twenty (20) feet into the backyard of Lot 2, before it can taper down to a height of 6-feet. Likewise, at the approximate location at which the backyard ends and residential construction begins, the wall can also taper down to a minimum height of 6-feet along the Lot 1 frontage of W. Barstow Avenue. The approximate location at which the 7-foot sound wall is required is indicated on Figure 2.

Table V summarizes the project site noise exposure (worst-case 2046 traffic conditions) at the nine proposed residential lots, with the above-described sound walls in place. As described above, the noise levels provided in Table V reflect those that would occur with the noise reduction (attenuation) provided by the sound walls (all walls to be constructed to a minimum height of 6-feet, with the exception of Outlot C, Lot 1, which will require a 7-foot sound wall, as indicated on Figure 2).

**TABLE V**  
**MODELED TRAFFIC NOISE LEVELS, dB, L<sub>dn</sub>**  
**WITH 6-FOOT SOUND WALL (7-FOOT SOUND WALL AT OUTLOT C, LOT 1)**  
**TENTATIVE TRACT 5224, OUTLOTS A & C, FRESNO**

Lot	2046 Conditions W/6-Foot Soundwall <sup>1</sup>
Outlot A – Lot A	59
Outlot A – Lot B	59
Outlot A – Lot C	60
<sup>1</sup> Outlot C – Lot 1	59
Outlot C – Lot 2	59
Outlot C – Lot 3	59
Outlot C – Lot 4	59
Outlot C – Lot 5	53
Outlot C – Lot 6	57

Source: WJV Acoustics  
Fresno COG

<sup>1</sup>7-Foot Soundwall at Outlot C, Lot 1

**Interior Noise Exposure:**

The City of Fresno interior noise level standard is 45 dB L<sub>dn</sub>. The worst-case noise exposure within the proposed residential development would be approximately 66 dB L<sub>dn</sub>. This means that the proposed residential construction must be capable of providing a minimum outdoor-to-indoor noise level reduction (NLR) of approximately 21 dB (66-45=21).

A specific analysis of interior noise levels was not performed. However, it may be assumed that residential construction methods complying with current building code requirements will reduce exterior noise levels by approximately 25 dB if windows and doors are closed. This will be sufficient for compliance with the City’s 45 dB L<sub>dn</sub> interior standard at all proposed lots. Requiring that it be possible for windows and doors to remain closed for sound insulation means that air conditioning or mechanical ventilation will be required.

## CONCLUSIONS AND RECOMMENDATIONS

The proposed Outlot A and Outlot C residential development will comply with all City of Fresno exterior and interior noise level standards, provided the following measures are incorporated into project design.

- The existing 6-foot CMU block wall remains at Outlot A and the proposed 6-foot sound wall is constructed at Outlot C.
- The sound wall at Outlot C, Lot 1 must be constructed to a minimum height of 7-feet.
- Suitable construction materials for sound walls include concrete blocks, masonry, or stucco on both sides of a wood or steel stud wall.
- Mechanical ventilation or air conditioning must be provided for all homes so that windows and doors can remain closed for sound insulation purposes.

The conclusions and recommendations of this acoustical analysis are based upon the best information known to WJV Acoustics Inc. (WJVA) at the time the analysis was prepared concerning the proposed lot layout plan, project site elevation, traffic volumes and roadway configurations. Any significant changes in these factors will require a reevaluation of the findings of this report. Additionally, any significant future changes in motor vehicle technology, noise regulations or other factors beyond WJVA's control may result in long-term noise results different from those described by this analysis.

Respectfully submitted,



Walter J. Van Groningen  
President

WJV:wjv





**FIGURE 3: PROJECT SITE VICINITY AND NOISE MEASUREMENT LOCATION**



**FIGURE 4: VETERANS BOULEVARD NOISE MEASUREMENT SITE**



**FIGURE 5: N. BRYAN AVENUE NOISE MEASUREMENT SITE**





**FIGURE 6: W. BARSTOW AVENUE NOISE MEASUREMENT SITE**



## APPENDIX A

### ACOUSTICAL TERMINOLOGY

<b>AMBIENT NOISE LEVEL:</b>	The composite of noise from all sources near and far. In this context, the ambient noise level constitutes the normal or existing level of environmental noise at a given location.
<b>CNEL:</b>	Community Noise Equivalent Level. The average equivalent sound level during a 24-hour day, obtained after addition of approximately five decibels to sound levels in the evening from 7:00 p.m. to 10:00 p.m. and ten decibels to sound levels in the night before 7:00 a.m. and after 10:00 p.m.
<b>DECIBEL, dB:</b>	A unit for describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
<b>DNL/L<sub>dn</sub>:</b>	Day/Night Average Sound Level. The average equivalent sound level during a 24-hour day, obtained after addition of ten decibels to sound levels in the night after 10:00 p.m. and before 7:00 a.m.
<b>L<sub>eq</sub>:</b>	Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L <sub>eq</sub> is typically computed over 1, 8 and 24-hour sample periods.
<b>NOTE:</b>	The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L <sub>eq</sub> represents the average noise exposure for a shorter time period, typically one hour.
<b>L<sub>max</sub>:</b>	The maximum noise level recorded during a noise event.
<b>L<sub>n</sub>:</b>	The sound level exceeded "n" percent of the time during a sample interval (L <sub>90</sub> , L <sub>50</sub> , L <sub>10</sub> , etc.). For example, L <sub>10</sub> equals the level exceeded 10 percent of the time.

## A-2

### ACOUSTICAL TERMINOLOGY

#### **NOISE EXPOSURE**

##### **CONTOURS:**

Lines drawn about a noise source indicating constant levels of noise exposure. CNEL and DNL contours are frequently utilized to describe community exposure to noise.

#### **NOISE LEVEL**

##### **REDUCTION (NLR):**

The noise reduction between indoor and outdoor environments or between two rooms that is the numerical difference, in decibels, of the average sound pressure levels in those areas or rooms. A measurement of “noise level reduction” combines the effect of the transmission loss performance of the structure plus the effect of acoustic absorption present in the receiving room.

##### **SEL or SENEL:**

Sound Exposure Level or Single Event Noise Exposure Level. The level of noise accumulated during a single noise event, such as an aircraft overflight, with reference to a duration of one second. More specifically, it is the time-integrated A-weighted squared sound pressure for a stated time interval or event, based on a reference pressure of 20 micropascals and a reference duration of one second.

##### **SOUND LEVEL:**

The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the response of the human ear and gives good correlation with subjective reactions to noise.

#### **SOUND TRANSMISSION**

##### **CLASS (STC):**

The single-number rating of sound transmission loss for a construction element (window, door, etc.) over a frequency range where speech intelligibility largely occurs.

APPENDIX B  
EXAMPLES OF SOUND LEVELS

