

ACOUSTICAL ANALYSIS

**DEL NORTE ESTATES
KERMAN, CALIFORNIA**

WJVA Project No. 23-55

PREPARED FOR

**CRAWFORD & BOWEN PLANNING, INC.
113 N. CHURCH STREET, SUITE 310
VISALIA, CALIFORNIA 93291**

PREPARED BY

**WJV ACOUSTICS, INC.
VISALIA, CALIFORNIA**



wjv acoustics

MAY 1, 2024

INTRODUCTION

Infill 360, on behalf of George Holland, has submitted entitlements pertaining to 48 acres of property located on the northwest corner of West Whitesbridge Road (Freeway 180) and North Del Norte Avenue in Kerman, California. The subject site is currently in the unincorporated area of Fresno County and borders the City of Kerman on the west and south and will require annexation to the City of Kerman. It is the intent of the applicant to entitle and develop the subject property for the construction of up to 200 single family residential units, 5000 square-foot minimum, on 38 acres of the subject site; a proposed R-3 zoned multiple family development that will yield up to 25 units per acre; and a proximate 6.0 acre parcel that will remain general commercial that may house a mid-major tenant of 15,000 square feet with additional pads which may be drive through facilities.

The following applications are being proposed:

General Plan Amendment 2023-xx. is an amendment of the Land Use Map of the 2040 Kerman General Plan to change the land use designation of the subject property from 15.0 acres of "General Commercial" planned land use to 6.0 acres of General Commercial planned land use and 4.0 acres of High Density Residential planned land use. The amount of medium density residential planned land use will increase by 3 acres from 35 acres to 38 acres.

Rezone Application (Prezone) No. 2024-xx is proposal to amend the current zoning from Fresno County Agricultural Zoning (AE-20, Exclusive Agriculture 20 acre minimum) to the following City of Kerman zone districts; 38 acres of R-1 zoning (Single Family Residential), 4.0 acres of R-3 zoning (High Density Residential), and 6.0 acres of General Commercial zoning. These zone districts are consistent with the proposed General Plan land use designations listed above.

Reorganization (Annexation) No, 2023-xx is a request to annex the subject 48 acres into the City of Kerman and detach it from the Kings River Conservation District. This request may be expanded to include an adjacent property to the east. This inclusion would be for annexation purposes only. Any future development of this additional property would require separate applications from the adjacent property owner. In addition, the subject property is currently in an Agricultural Preserve Contract (Williamson Act) Nos. AP-8116 and AP-8119. It is the intent of the project applicant to have these contracts cancelled. This particular action requires approval from the Fresno County Board of Supervisors and will occur after the subject entitlements are approved by the City of Kerman.

Tentative Subdivision Map 2023-xx is a request to subdivide the site into a 38-acre parcel that will accommodate up to 200 single family residential lots (which contains area for a potential storm drainage basin), a 4.0-acre lot for multi-family residential development up to 25 units per acre; and a 6.0-acre lot for general commercial development. Exhibit 1 shows the proposed subdivision design.

NOISE EXPOSURE CRITERIA

General Plan-

The City of Kerman 2040 General Plan (adopted July 2020) sets noise compatibility standards for transportation noise sources in terms of the Day-Night Average Level (L_{dn}). Implementing Policy PH-8.2 of the Public Health and Safety Element establishes a land use compatibility criterion as 60 dB L_{dn} for exterior noise exposure within outdoor activity areas of residential land uses. Outdoor activity areas generally include backyards of single-family residences, individual patios or decks of multi-family developments and common outdoor recreation areas of multi-family developments. The intent of the exterior noise level requirement is to provide an acceptable noise environment for outdoor activities and recreation.

Additionally, Implementing Policy PH-8.2 of the Public Health and Safety 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.

The City of Kerman General Plan also provides exterior noise level standards for non-transportation (stationary) noise sources. The standards become more restrictive during the nighttime hours (10:00 p.m. to 7:00 a.m.). The stationary noise level standards are established in terms of the hourly average equivalent noise level (L_{eq}) and the maximum hourly noise level (L_{max}). Table I provides the applicable City of Kerman exterior noise level standards for stationary noise sources.

TABLE I NON-TRANSPORTATION NOISE LEVEL STANDARDS, dBA CITY OF KERMAN GENERAL PLAN			
Daytime (7 a.m.-10 p.m.)		Nighttime (10 p.m.-7 a.m.)	
L_{eq}	L_{max}	L_{eq}	L_{max}
50	70	45	65
Source: City of Kerman General Plan			

Construction Noise and Vibration -

Section 9.26 (Prohibition of Unreasonably Loud and Unnecessary Noise) of The City of Kerman Code of Ordinances prohibits construction activities outside of the hours of 7:00 a.m. to 10:00 p.m.

There are no City of Kerman vibration level standards. Some guidance is provided by the Caltrans Transportation and Construction Vibration Guidance Manual. The Manual provides guidance for determining annoyance potential criteria and damage potential threshold criteria. These criteria

are provided below in Table III and Table IV, and are presented in terms of peak particle velocity (PPV) in inches per second (in/sec).

TABLE II		
GUIDELINE VIBRATION ANNOYANCE POTENTIAL CRITERIA		
Human Response	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Barely Perceptible	0.04	0.01
Distinctly Perceptible	0.25	0.04
Strongly Perceptible	0.9	0.1
Severe	2.0	0.4
Source: Caltrans		

TABLE III		
GUIDELINE VIBRATION DAMAGE POTENTIAL THRESHOLD CRITERIA		
Structure and Condition	Maximum PPV (in/sec)	
	Transient Sources	Continuous/Frequent Intermittent Sources
Extremely fragile, historic buildings, ancient monuments	0.12	0.08
Fragile buildings	0.2	0.1
Historic and some old buildings	0.5	0.25
Older residential structures	0.5	0.3
New residential structures	1.0	0.5
Modern industrial/commercial buildings	2.0	0.5
Source: Caltrans		

PROJECT SITE NOISE EXPOSURE

The project site is located northwest of the intersection of W. Whitesbridge Avenue (SR 180) and N. Del Norte Avenue, in a currently unincorporated portion of Fresno County, near the City of Kerman, California. The project will be annexed within the City of Kerman as part of the project. The project site is currently bordered to the north and east by agricultural land uses, and to the south and west by residential land uses. Kerman High School is located southeast of the project site. Existing sources of noise in the project vicinity are dominated by traffic noise associated with vehicles traveling on W. Whitesbridge Avenue and N. Del Norte Avenue. Additional sources of noise observed during project site visits include noise associated with agricultural activities, noise associated with Kerman High School, noise associated with residential land uses (barking dogs, landscaping activities, construction activities, etc.) and occasional aircraft overflights.

Background Noise Level Measurements

Measurements of existing ambient noise levels in the project vicinity were conducted on January 31 & February 1, 2024. Long-term (24-hour) ambient noise level measurements were conducted at two (2) locations (sites LT-1 and LT-2). Ambient noise levels were measured for a period of 24 continuous hours at each of the two locations. Site LT-1 was located along the eastern project boundary, along N. Del Norte Avenue, approximately 1,000 feet north of Whitesbridge Avenue. Site LT-1 was predominantly exposed to noise sources associated with vehicle traffic on N. Del Norte Avenue as well as noise sources associated with nearby agricultural activities. Site LT-2 was located near the southwest corner of the project site, in the vicinity of existing residential land uses adjacent to the project site. Site LT-2 was predominantly exposed to noise associated with vehicles traveling on Whitesbridge Avenue. The locations of the long-term ambient sites are provided as Figure 2.

Noise monitoring equipment consisted of Larson-Davis Laboratories Model LDL-820 sound level analyzers equipped with B&K Type 4176 1/2" microphones. The equipment complies with the specifications of the American National Standards Institute (ANSI) for Type I (Precision) sound level meters. The meters were calibrated with a B&K Type 4230 acoustic calibrator to ensure the accuracy of the measurements.

Measured hourly energy average noise levels (L_{eq}) at site LT-1 ranged from a low of 49.8 dB between 1:00 a.m. and 2:00 a.m. to a high of 61.9 dB between 6:00 a.m. and 7:00 a.m. Hourly maximum (L_{max}) noise levels at site LT-1 ranged from 70.1 to 87.4 dB. Residual noise levels at the monitoring site, as defined by the L_{90} , ranged from 40.1 to 48.5 dB. The L_{90} is a statistical descriptor that defines the noise level exceeded 90% of the time during each hour of the sample period. The L_{90} is generally considered to represent the residual (or background) noise level in the absence of identifiable single noise events from traffic, aircraft, and other local noise sources. The measured L_{dn} value at site LT-1 was 63.1 dB L_{dn} . Figure 3 graphically depicts hourly variations in ambient noise levels at site LT-1. Figure 4 provides a photograph of measurement site LT-1.

Measured hourly energy average noise levels (L_{eq}) at site LT-2 ranged from a low of 53.9 dB between midnight and 1:00 a.m. to a high of 66.8 dB between 7:00 a.m. and 8:00 a.m. Hourly

maximum ($L_{\max}$) noise levels at site LT-2 ranged from 74.8 to 90.1 dB. Residual noise levels at the monitoring site, as defined by the L_{90} , ranged from 44.2 to 51.0 dB. The measured L_{dn} value at site LT-2 was 67.2 dB L_{dn} . Figure 5 graphically depicts hourly variations in ambient noise levels at site LT-2. Figure 6 provides a photograph of measurement site LT-2.

Additionally, short-term (15-minute) ambient noise level measurements were conducted at four (4) locations (Sites ST-1 through ST-4). Two (2) individual measurements were taken at each of the four short-term sites to quantify ambient noise levels in the morning and afternoon hours. The locations of the short-term noise monitoring sites are provided on Figure 2.

Short-term noise measurements were conducted for 15-minute periods at each of the four sites. Site ST-1 was located at the corner of W. Sapphire Avenue and N. Almond Avenue, in the residential neighborhood west of the project site. Site ST-2 was located near the corner of W. Isabella Avenue and N. Almond Avenue, in the residential neighborhood west of the project site. Site ST-3 was located near W. Gateway Boulevard and S. Del Norte Avenue, near the residential neighborhood south of the project site, and in the vicinity of Kerman High School. Site ST-4 was located near the northwest corner of Whitesbridge Avenue and Del Norte Avenue.

Table IV summarizes short-term noise measurement results. The noise measurement data included energy average (L_{eq}) maximum ($L_{\max}$) as well as five (5) individual statistical parameters. Observations were made of the dominant noise sources affecting the measurements. The statistical parameters describe the percent of time a noise level was exceeded during the measurement period. For instance, the L_{90} describes the noise level exceeded 90 percent of the time during the measurement period.

TABLE IV SUMMARY OF SHORT-TERM NOISE MEASUREMENT DATA DEL NORTE ESTATES, KERMAN JANUARY 31 & FEBRUARY 1, 2024									
Site	Time	A-Weighted Decibels, dBA							Sources
		L_{eq}	$L_{\max}$	L_2	L_8	L_{25}	L_{50}	L_{90}	
ST-1	8:45 a.m.	56.8	65.0	64.2	61.7	57.8	53.7	49.4	TR, B, D, C
ST-1	4:00 p.m.	57.4	68.2	64.7	62.0	57.4	53.0	49.8	TR, D
ST-2	9:05 a.m.	49.3	53.5	52.7	51.6	50.0	49.0	47.1	TR, AG, D
ST-2	4:20 p.m.	51.4	62.8	55.5	53.0	52.8	50.4	48.6	TR, D
ST-3	9:25 a.m.	57.2	67.5	66.1	62.4	56.2	53.1	49.7	TR, AC
ST-3	4:40 p.m.	59.0	70.4	68.8	63.2	57.1	53.8	48.5	TR
ST-4	9:45 a.m.	65.6	73.0	70.9	69.9	67.2	63.6	55.2	TR
ST-4	5:00 p.m.	67.1	77.8	72.4	70.5	69.1	65.3	56.8	TR

TR: Traffic AC: Aircraft AG: Agricultural Activities C: Construction Activities B: Birds D: Barking Dogs V:Voices L: Landscaping Activities
Source: WJV Acoustics, Inc.

Traffic Noise Exposure:

Project-Site noise exposure from traffic on adjacent roadways was calculated for existing and future (2044) conditions using the FHWA Traffic Noise Model and traffic data obtained from the project traffic engineer, Ruettgers & Schuler Civil Engineers. A description of the noise model, applied data, methodology and findings is provided below.

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 ± 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.

Annual Average Daily Traffic (AADT) data for W. Whitesbridge Avenue and N. Del Norte Avenue in the project vicinity was obtained from the project traffic study. 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. A speed limit of 40 mph was assumed for N. Del Norte Avenue and 50 mph for W. Whitesbridge Avenue. Table V summarizes annual average traffic data used to model noise exposure within the project site.

TABLE V				
TRAFFIC NOISE MODELING ASSUMPTIONS DEL NORTE ESTATES, KERMAN				
	N. Del Norte Ave		W. Whitesbridge Ave	
	Existing	2044	Existing	2044
Annual Avenue Daily Traffic (AADT)	2,850	2,980	11,990	17,590
Day/Night Split (%)	90/10			
Assumed Vehicle Speed (mph)	40		50	
% Medium Trucks (% AADT)	2			
% Heavy Trucks (% AADT)	1			
Sources: Ruettgers & Schuler WJV Acoustics, Inc.				

The City of Kerman General Plan Noise Element establishes an exterior noise level standard of 60 dB L_{dn} for outdoor activity areas of residential uses. Outdoor activity areas generally include backyards of single-family residences and individual patios or decks and common outdoor activity areas of multi-family developments. The noise element also requires that interior noise levels attributable to exterior noise sources not exceed 45 dB L_{dn} .

The proposed project includes sensitive receptors (residential land uses) that could be impacted by traffic noise exposure adjacent to W. Whitesbridge Avenue and N. Del Norte Avenue. WJVA used the above-described FHWA traffic noise model and traffic noise modeling assumptions to determine the distances from the center of each roadway to the 60 dB L_{dn} noise exposure contours. Table VI provides the distances from the center of N. Del Norte Avenue and W. Whitesbridge Avenue (adjacent to the project site) to the 60 dB L_{dn} noise exposure contours. Table VI provides the contour distances for 2044 Cumulative conditions as they represent a worst-case assessment of noise exposure at proposed sensitive receptor locations.

TABLE VI DISTANCES TO TRAFFIC NOISE CONTOURS DEL NORTE ESTATES, KERMAN CUMULATIVE 2044 CONDITIONS	
Roadway Segment (At Project Site Frontage)	Distance (feet) From Roadway Centerline to 60 dB L_{dn} Contour
N. Del Norte Avenue	49
W. Whitesbridge Avenue	229

Source: WJV Acoustics, Inc.

Potential Impact:

A noise impact would occur if the outdoor activity areas of proposed sensitive receptors are located within the 60 dB L_{dn} traffic noise contours. Based upon a review of the project site plan (provided as Figure 1), WJVA estimates that the setback distances from the center of the closest proposed backyards to the centerline of both Del Norte Avenue and Whitesbridge Avenue to be approximately seventy (70) feet. At this distance exterior noise levels within the closest residential backyards to Whitesbridge Avenue would be approximately 68 dB L_{dn} . As such, noise mitigation would be required for the closest proposed residential lots to Whitesbridge Avenue.

Mitigation Measures:

Noise levels from transportation noise sources may be effectively mitigated by incorporating noise mitigation measures into the project design that consider the geographical relationship between the noise sources of concern and potential receptors, the noise-producing characteristics of the sources and the path of transmission between noise sources and sensitive receptors. Options for noise mitigation include the use of building setbacks and the construction of sound walls.

Based upon a review of the project site plan, mitigation would be required for the closest proposed residential lots along Whitebridge Avenue. To mitigate exterior traffic noise exposure along W. Whitesbridge Avenue it will be necessary to construct a sound wall along the roadway. The sound wall will provide acoustical shielding of backyards located closest 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 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. It was assumed by WJVA that the building pad elevations at the closest proposed homes to E. Ashlan Avenue will be approximately the same elevation as the roadway pavement.

Based upon the above-described assumptions and method of analysis, the noise level insertion loss values for sound walls of various heights were calculated. The calculations indicated that a sound wall along W. Whitesbridge Avenue (at the residential lots adjacent to the roadway) constructed to a minimum height of seven-and-a-half (7.5) feet above project site grade would result in exterior noise levels of approximately 59 dB L_{dn} within the closest proposed backyards to W. Whitesbridge Avenue. It should be noted that the sound wall be effective at first-floor receiver locations only. If two-story construction is proposed along the closest lots to Whitesbridge Avenue, noise levels would exceed 60 dB L_{dn} at any second-floor balconies facing the roadway.

Interior Noise Exposure:

The City of Kerman interior noise level standard is 45 dB L_{dn} . The worst-case noise exposure within the proposed residential development would be approximately 59 dB L_{dn} at first-floor receiver locations and approximately 68 dB L_{dn} at second-floor receiver locations, if two-story construction is proposed (above-described sound wall would be effective at first-floor elevations only). This means that the proposed residential construction must be capable of providing a minimum outdoor-to-indoor noise level reduction (NLR) of approximately 23 dB (68-45=23).

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_{dn} 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.

PROJECT NOISE IMPACTS TO OFF-SITE SENSITIVE RECEPTORS

Project-Related Increases In Traffic Noise Exposure

WJVA utilized the FHWA Traffic Noise Model to quantify expected project-related increases in traffic noise exposure along roadways in the project vicinity. The FHWA Model is a standard analytical method used by state and local agencies for roadway traffic noise prediction. 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 ± 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.

Traffic noise exposure levels for Existing, Existing Plus Project, 2044 Cumulative and 2044 Cumulative Plus Project traffic conditions were calculated based upon the FHWA Model and traffic volumes provided by the project traffic engineer, Ruettgers & Schuler Civil Engineers. The day/night distribution of traffic and the percentages of used for modeling were estimated based upon previous studies WJVA has conducted along similar roadways as such data was not available from governmental sources. The Noise modeling assumptions used to calculate project traffic noise are provided as Appendix C.

Project-related significant impacts would occur if an increase in traffic noise associated with the project would result in noise levels exceeding the City's applicable noise level standards at the location(s) of sensitive receptors. For the purpose of this analysis a significant impact is also assumed to occur if traffic noise levels were to increase by 3 dB at sensitive receptor locations where noise levels already exceed the City's applicable noise level standards (without the project), as 3 dB generally represents the threshold of perception in change for the human ear. This analysis of project traffic noise focuses on residential land uses, as they represent the most restrictive noise level criteria by land use type provided in the General Plan.

The City's exterior noise level standard for residential land uses is 60 dB L_{dn} . Traffic noise was modeled at ten (10) receptor locations. The ten modeled receptors are located at roadway setback distances representative of the sensitive receptors (residences) along each analyzed roadway segment. With the exception of receptors R-1, R-4 and R-6, all receptors either have an existing sound wall or the backyards are acoustically shielded by the house structures. The modeled traffic noise receptors are described below and provided graphically as Figure 7.

- R-1: Residence located approximately 80 feet from the centerline of W. Nielsen Ave
- R-2: Residence located approximately 100 feet from the centerline of Whitesbridge Ave
- R-3: Residence located approximately 85 feet from the centerline of S. Del Norte Ave
- R-4: Residence located approximately 115 feet from the centerline of N. Del Norte Ave
- R-5: Residence located approximately 135 feet from the centerline of W. Kearney Blvd

- R-6: Residence located approximately 90 feet from the centerline of S. Del Norte Ave
- R-7: Residence located approximately 90 feet from the centerline of S. Del Norte Ave
- R-8: Residence located approximately 130 feet from the centerline of W. Kearney Blvd
- R-9: Residence located approximately 115 feet from the centerline of W. Kearney Blvd
- R-10: Residence located approximately 110 feet from the centerline of W. Kearney Blvd

Existing Conditions

Table VII provides Existing and Existing Plus Project traffic noise exposure levels at the ten analyzed receptor locations.

TABLE VII PROJECT-RELATED INCREASES IN TRAFFIC NOISE, dB, L_{dn} DEL NORTE ESTATES, KERMAN EXISTING CONDITIONS				
Modeled Receptor	Existing	Existing Plus Project	Change (Maximum)	Significant Impact?
R-1	43	45	+2	No
R-2	55	56	+1	No
R-3	52	54	+2	No
R-4	48	54	+6	No
R-5	51	51	0	No
R-6	55	57	+2	No
R-7	48	48	0	No
R-8	51	51	0	No
R-9	52	52	0	No
R-10	52	53	+1	No

Source: WJV Acoustics, Inc.
Ruettggers & Schuler

Reference to Table VII indicates that project-related traffic for Existing conditions would not result in noise levels at any sensitive receptors to exceed the City's noise level standard, nor result in an increase of 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project.

2044 Cumulative Conditions

Table VIII provides 2044 Cumulative traffic noise exposure levels at the ten analyzed representative receptor locations, and provides what the project contribution would be to 2044 Cumulative conditions.

TABLE VIII PROJECT-RELATED INCREASES IN TRAFFIC NOISE, dB, L _{dn} DEL NORTE ESTATES, KERMAN 2044 CUMULATIVE CONDITIONS				
Modeled Receptor	2044	2044 Plus Project	Change (Maximum)	Significant Impact?
R-1	44	45	+1	No
R-2	57	58	+1	No
R-3	54	55	+1	No
R-4	49	54	+5	No
R-5	53	53	0	No
R-6	56	58	+2	No
R-7	50	50	0	No
R-8	53	53	0	No
R-9	53	54	+1	No
R-10	54	54	0	No

Source: WJV Acoustics, Inc.
Ruettggers & Schuler

Reference to Table VIII indicates that project-related traffic for 2044 Cumulative conditions would not result in noise levels at any sensitive receptors to exceed the City's noise level standard, nor result in an increase of 3 dB in any sensitive receptor locations where noise levels already exceed the City's noise level standard without the implementation of the project.

Commercial/Retail Noise Levels

The project would include an approximately 6-acre commercial component, to be located within the southeast portion of the overall project site. The exact uses and tenants of the commercial component were not known at the time this analysis was prepared, but it is assumed it may house a mid-major tenant of 15,000 square feet, with additional pads which may be drive through facilities.

Without more specific information regarding the commercial component, it is not possible to precisely determine noise levels and potential impacts on both existing and proposed sensitive receptors near the commercial land uses. Typical examples of stationary noise sources associated with such commercial/retail land uses include:

- HVAC/Mechanical equipment
- Truck deliveries
- Parking lot activities (closing of car doors and trunks, stereos, alarms etc.)
- Drive Through operations
- Loading docks
- Compactors

HVAC Mechanical Equipment

It is assumed that the project would include roof-mounted HVAC units on commercial buildings. The heating, ventilating, and air conditioning (HVAC) requirements for the buildings would likely require the use of multiple packaged roof-top units. For the purpose of noise and aesthetics, roof-mounted HVAC units are typically shielded by means of a roof parapet. WJVA has conducted reference noise level measurements at numerous commercial and retail buildings with roof-mounted HVAC units, and associated noise levels typically range between approximately 45-50 dB at a distance of 50 feet from the building façade.

Truck Movements

At the time of this analysis, truck delivery times and frequency as well as truck access route (or routes) had not been designated for potential uses. WJVA has conducted measurements of the noise levels produced by slowly moving trucks for a number of studies. Such truck movements would be expected to produce noise levels in the range of 65 to 71 dBA at a distance of 100 feet. The range in measured truck noise levels is due to differences in the size of trucks, their speed of movement and whether they have refrigeration units in operation during the pass-by.

Parking Lot Activities

Noise due to traffic in parking lots is typically limited by low speeds and is not usually considered to be significant. Human activity in parking lots that can produce noise includes voices, stereo systems and the opening and closing of car doors and trunk lids. Such activities can occur at any time. The noise levels associated with these activities cannot be precisely defined due to variables such as the number of parking movements, time of day and other factors. It is typical for a passing car in a parking lot to produce a maximum noise level of 60-65 dBA at a distance of 50 feet, which is comparable to the level of a raised voice.

Drive-Through Retail

It is anticipated that the project would include commercial/retail uses that would include drive-through operations. The current site plan (Figure 1) indicates a drive-through use near the southeast corner of the project site (near the intersection of Whitesbridge Avenue and Del Norte Avenue). The drive-through would be located approximately 250 feet from existing sensitive receptor locations and approximately 400 feet from the closest proposed sensitive receptors. A discussion of potential noise levels associated with typical drive-through quick-service restaurants is provided below.

In order to assess noise levels associated with potential drive-through operations, a description of previously measured noise levels is provided. WJVA conducted reference noise measurements

at a Wendy's drive-through restaurant located on South Mooney Boulevard in Visalia. Measurements were conducted during the early afternoon of July 11, 2011 between 12:45 p.m. and 1:45 p.m. using the previously-described noise monitoring equipment.

The microphone used by customers to order food and the loudspeaker used by employees to confirm orders are both integrated into a menu board that is located a few feet from the drive-through lane at the approximate height of a typical car window. Vehicles would enter the drive-through lane from the west and then turn to the north along the east side of the restaurant.

Reference noise measurements were obtained at a distance of approximately 40 feet from the menu board containing the microphone/loudspeaker system at an angle of about 45° toward the rear of the vehicle being served. This provided a worst-case exposure to sound from the loudspeaker system since the vehicle was not located directly between the loudspeaker and measurement location. Cars were lined up in the access lane during the noise measurement period indicating that the drive-through lane was operating at or near a peak level of activity.

Each ordering cycle was observed to take approximately 60 seconds including vehicle movements. A typical ordering cycle included 5-10 seconds of loudspeaker use with typical maximum noise levels in the range of 60-62 dB at the 40 foot-reference location. Vehicles moving through the drive-through lane produced noise levels in the range of 55-60 dBA at the same distance. Vehicles parked at the ordering position (between the menu board and measurement site) were observed to provide significant acoustic shielding during the ordering sequence. The effects of such shielding are reflected by the noise measurement data. Noise levels were measured to approximately 60 dB L_{eq} at the measurement site, and included noise from all sources, including the loudspeaker, vehicle movements and HVAC equipment.

As described above, the closest existing sensitive receptors to the drive-through location are approximately 250 feet and the closest proposed sensitive receptors are approximately 400 feet from the drive-through. At these distances, noise associated with drive-through operations would be in the range of approximately 40-44 dB. Such levels do not exceed City of Kerman noise level standards or existing ambient noise levels.

Loading Dock Activities

It was not known at the time this analysis was prepared if the commercial component of the project would include any loading docks. Noise sources typically associated with loading dock activities include truck engines, the operation of truck-mounted refrigeration units, fork lifts, the banging of hand carts and roll-up doors, noise from P.A. systems, and the voices of truck drivers and store employees. Truck engines and/or refrigeration units are typically turned off while trucks are in loading dock areas to reduce noise and save energy.

Based upon noise level measurements conducted by WJVA for other studies, loading dock noise levels would be expected to be in the range of approximately 59 to 77 dB at a distance of 100 feet.

Compactor

Commercial/Retail uses could include outdoor refuse and cardboard compactors. Based upon noise studies conducted by WJVA for other projects, the maximum noise level produced by a typical un-enclosed trash compactor (Hydra-Fab Model 1200) is approximately 74 dB at a distance of 10 feet from the equipment.

Potential Impact:

Noise levels from new stationary noise sources cannot be predicted with any certainty at this time since specific uses have not yet been proposed and the locations of stationary noise sources relative to the locations of noise sensitive uses are not known. However, under some circumstances there is a potential for such uses to exceed the City's noise standards for stationary noise sources at the locations of sensitive receptors.

Mitigation Measures:

Noise levels from new stationary noise sources may be effectively mitigated by incorporating noise mitigation measures into the project design that consider the geographical relationship between the noise sources of concern and potential receptors, the noise-producing characteristics of the sources and the path of transmission between noise sources and sensitive receptors. Options for noise mitigation include the use of building setbacks, the construction of sound walls and the use of noise source equipment enclosures.

When specific uses within the study area are proposed that could result in a noise-related conflict between a commercial or other stationary noise source and existing or proposed noise-sensitive receptor, an acoustical analysis should be required that quantifies project-related noise levels and recommends appropriate mitigation measures to achieve compliance with the City's noise standards. The acoustical analysis should be the responsibility of the project applicant and should be completed prior to issuance of a building permit.

Construction Noise and Vibration

Construction noise would occur at various locations within and near the project site through the buildout period. Existing sensitive receptors could be located as close as 100 feet from construction activities. Table VII provides typical construction-related noise levels at distances of 50, 100 feet, 200 feet, and 300 feet.

Construction noise is not considered to be a significant impact if construction is limited to the allowed hours and construction equipment is adequately maintained and muffled. Extraordinary noise-producing activities (e.g., pile driving) are not anticipated. The City of Kerman limits hours of construction activities to occur between 7:00 a.m. and 10:00 p.m. A noise impact could occur if construction activities were to occur outside the allowable hours of 7:00 a.m. to 10:00 p.m.

TABLE IX
TYPICAL CONSTRUCTION EQUIPMENT
MAXIMUM NOISE LEVELS, dBA

Type of Equipment	50 Ft.	100 Ft.	200 Ft.	300 Ft.
Concrete Saw	90	84	78	74
Crane	81	75	69	65
Excavator	81	75	69	65
Front End Loader	79	73	67	63
Jackhammer	89	83	77	73
Paver	77	71	65	61
Pneumatic Tools	85	79	73	69
Dozer	81	76	70	66
Rollers	80	74	68	64
Trucks	86	80	72	70
Pumps	80	74	68	64
Scrapers	87	81	75	71
Portable Generators	81	74	68	64
Backhoe	86	80	74	70
Grader	86	80	74	70

Source: FHWA

Noise Control for Buildings and Manufacturing Plants, Bolt, Beranek & Newman, 1987

A noise impact could occur if construction activities do not incorporate appropriate best management practices in regards to construction-related noise. The following best management practices should be implemented to minimize the potential for noise impacts on existing sensitive receptors in the project area, during project construction.

Best Management Practices:

Noise levels associated with construction activities may be effectively reduced by incorporating appropriate best management practices. The following best management practices should be applied during periods of project construction.

- All construction equipment shall be properly maintained and muffled as to minimize noise generation at the source.
- Noise-producing equipment shall not be operating, running, or idling while not in immediate use by a construction contractor.
- All noise-producing construction equipment shall be located and operated, to the extent possible, at the greatest possible distance from any noise-sensitive land uses.
- Locate construction staging areas, to the extent possible, at the greatest possible distances from any noise-sensitive land uses.

- Signs shall be posted at the construction site and near adjacent sensitive receptors displaying hours of construction activities and providing the contact phone number of a designated noise disturbance coordinator.

The dominant sources of man-made vibration are sonic booms, blasting, pile driving, pavement breaking, demolition, diesel locomotives, and rail-car coupling. None of these activities are anticipated to occur with construction or operation of the proposed project. Vibration from construction activities could be detected at the closest sensitive land uses, especially during movements by heavy equipment or loaded trucks and during some paving activities. Typical vibration levels at distances of 25, 100 feet and 300 feet are summarized by Table X. These levels would not be expected to exceed any significant threshold levels for annoyance or damage, as provided above in Table II and Table III.

TABLE X TYPICAL VIBRATION LEVELS DURING CONSTRUCTION			
Equipment	PPV (in/sec)		
	@ 25'	@ 100'	@ 300'
Bulldozer (Large)	0.089	0.019	0.006
Bulldozer (Small)	0.003	0.0006	0.0002
Loaded Truck	0.076	0.017	0.005
Jackhammer	0.035	0.008	0.002
Vibratory Roller	0.210	0.046	0.013
Caisson Drilling	0.089	0.019	0.006
Source: <i>Caltrans</i>			

IMPACT SUMMARY

This impact summary addresses only the noise impacts determined to be “potentially significant” and summarizes the appropriate measures that would be required to reduce noise levels to a “less than significant” level, if applicable.

- **Potential Impact:** Noise levels from new stationary noise sources associated with proposed commercial land uses within the project site could potentially impact both existing and proposed on-site sensitive receptors. The exact uses of the commercial component were not known at the time this analysis was prepared.

Mitigation: Noise levels from new stationary noise sources may be effectively mitigated by incorporating appropriate noise mitigation measures into the project design that consider the geographical relationship between the noise sources of concern and potential receptors, the noise-producing characteristics of the sources and the path of transmission between noise sources and sensitive receptors. If required, options for noise mitigation include the use of building setbacks, the construction of sound walls and the use of noise source equipment enclosures. When specific uses within the study area are proposed that could result in a noise-related conflict between a commercial or other stationary noise source and existing or proposed noise-sensitive receptor, an acoustical analysis may be required by the City that quantifies project-related noise levels and recommends appropriate mitigation measures to achieve compliance with the City’s noise standards.

- **Potential Impact:** A noise impact could occur if new proposed sensitive receptors (residential land uses) are located within the cumulative 60 dB L_{dn} traffic noise contours. Table IX provides the setback distances from the centerline of Del Norte Avenue and Whitesbridge Avenue to the 60 dB L_{dn} exterior noise level contour. Based upon the project site plan (Figure 1) and the analysis on traffic noise exposure levels, noise levels at the closest proposed residential lots to Whitesbridge Avenue would be expected to be approximately 68 dB L_{dn} (future 2044 traffic conditions) within individual backyards. Based upon the traffic noise analysis and the site plan, noise levels at the closest proposed residential land uses to Del Norte Avenue would not be expected to exceed 60 dB L_{dn} .

Mitigation: Noise levels from transportation noise sources may be effectively mitigated by incorporating noise mitigation measures into the project design that consider the geographical relationship between the noise sources of concern and potential receptors, the noise-producing characteristics of the sources and the path of transmission between noise sources and sensitive receptors. Options for noise mitigation include the use of building setbacks and the construction of sound walls.

The calculations indicated that a sound wall along W. Whitesbridge Avenue (at the residential lots adjacent to the roadway) constructed to a minimum height of seven-and-a-half (7.5) feet above project site grade would result in exterior noise levels of approximately 59 dB L_{dn} within the closest proposed backyards to W. Whitesbridge Avenue. It should be noted that the sound wall be effective at first-floor receiver locations only. If two-story construction is proposed along the closest lots to Whitesbridge Avenue, noise levels would exceed 60 dB L_{dn} at any second-floor balconies facing the roadway.

- **Potential Impact:** A noise impact could occur if construction activities occur outside of the allowable hours of construction and/or do not incorporate appropriate best management practices in regards to construction-related noise. Implement best management practices to minimize the potential for noise impacts on existing sensitive receptors in the project area, during project construction. The following provides the allowable hours of construction as well as generalized best management practices that should be applied during periods of project construction to ensure that noise impacts do not result from project construction:
 - Per the City of Kerman Code of Ordinances, construction activities should not occur outside the hours of 7:00 a.m. to 10:00 p.m. Construction activities that occur outside these hours would be subject to the stationary noise standards provided above in Table I.
 - All construction equipment shall be properly maintained and muffled as to minimize noise generation at the source.
 - Noise-producing equipment shall not be operating, running, or idling while not in immediate use by a construction contractor.
 - All noise-producing construction equipment shall be located and operated, to the extent possible, at the greatest possible distance from any noise-sensitive land uses.
 - Locate construction staging areas, to the extent possible, at the greatest possible distances from any noise-sensitive land uses.
 - Signs shall be posted at the construction site and near adjacent sensitive receptors displaying hours of construction activities and providing a contact phone number of a designated noise disturbance coordinator.

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 site plan, project site elevation, traffic volumes, roadway configurations and proposed land uses. 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,

A handwritten signature in blue ink, appearing to read 'Walter J. Van Groningen', with a stylized, flowing script.

Walter J. Van Groningen
President

WJV:wjv

23-55 (Del Norte Estates, Kerman) 5-1-24



23-55 (Del Norte Estates Kerman) 5-1-24



FIGURE 3: HOURLY NOISE LEVELS AT AMBIENT NOISE MEASUREMENT SITE LT-1

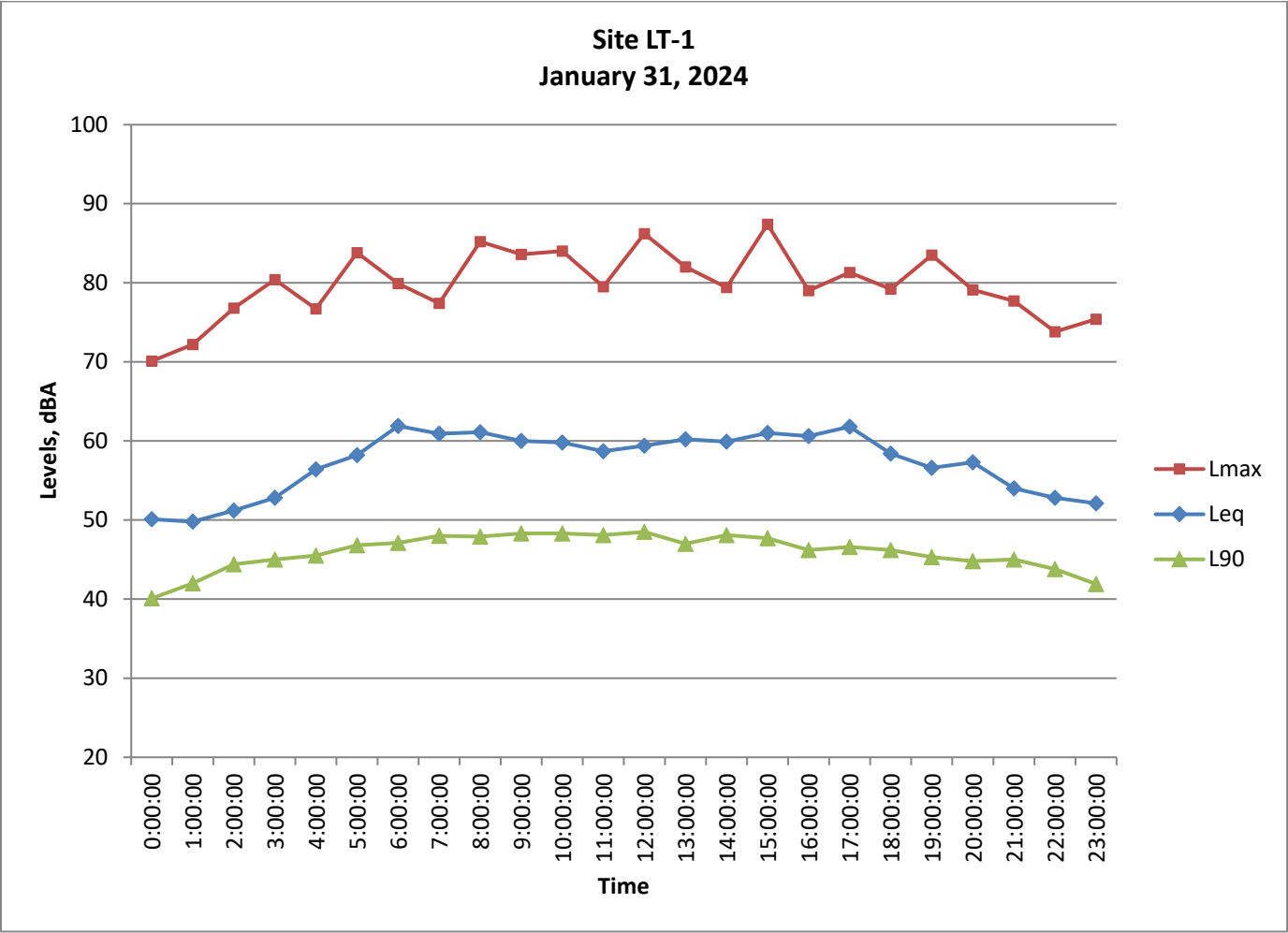


FIGURE 4: AMBIENT NOISE MEASUREMENT SITE LT-1



FIGURE 5: HOURLY NOISE LEVELS AT AMBIENT NOISE MEASUREMENT SITE LT-2

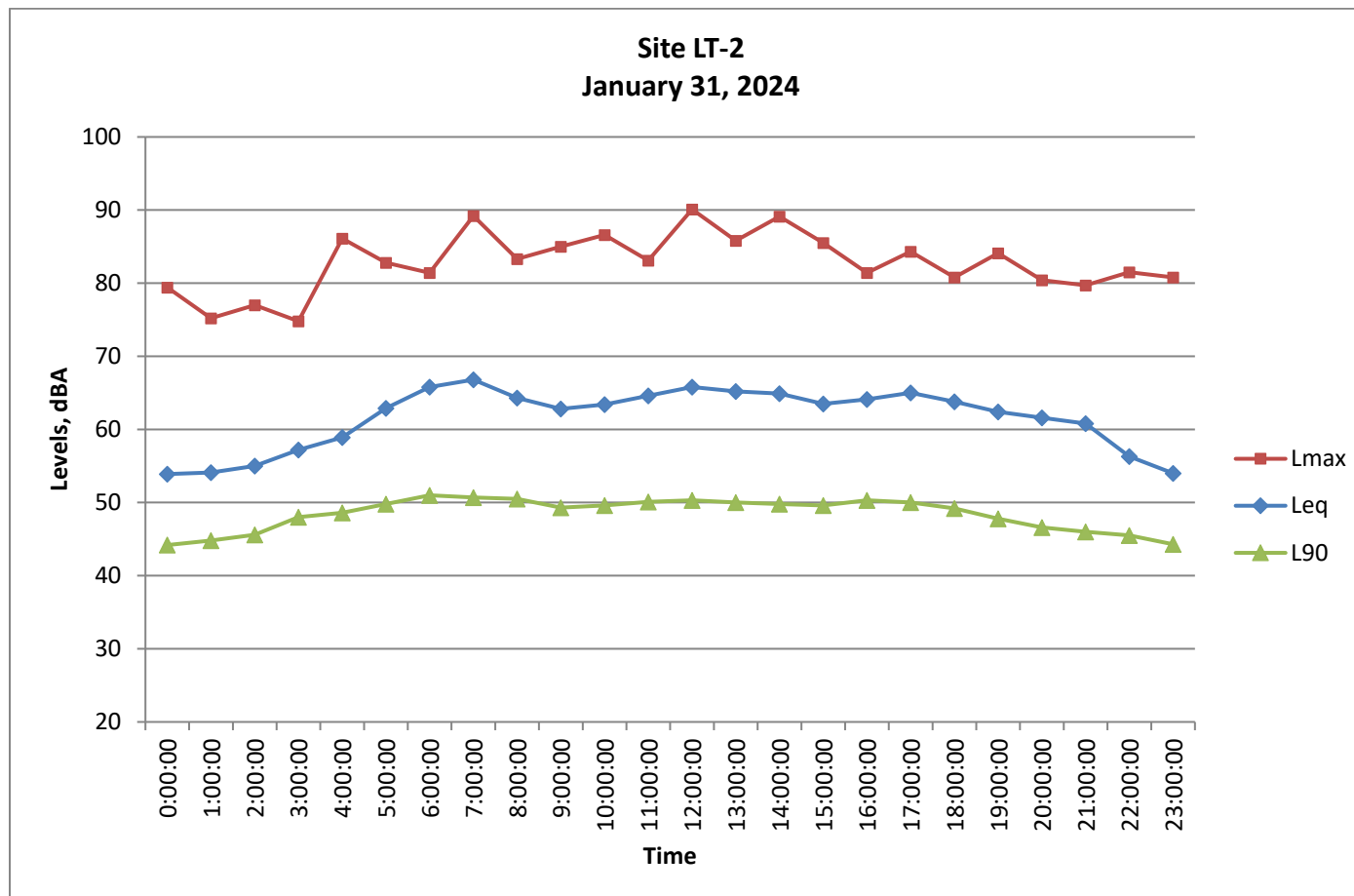
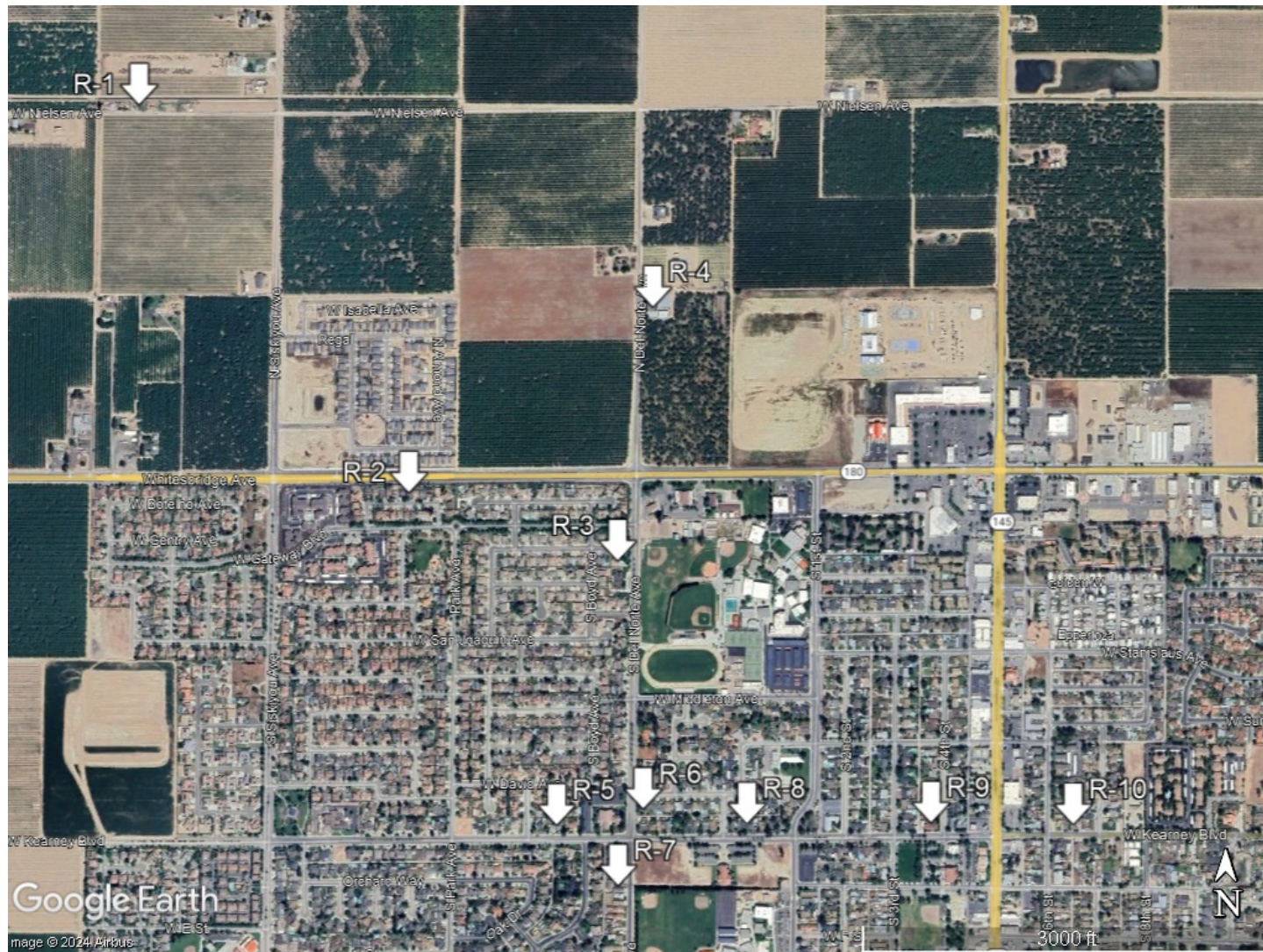


FIGURE 6: AMBIENT NOISE MEASUREMENT SITE LT-2



FIGURE 7: MODELED TRAFFIC NOISE EXPOSURE RECEPTORS



APPENDIX A

ACOUSTICAL TERMINOLOGY

AMBIENT NOISE LEVEL:	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.
CNEL:	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.
DECIBEL, dB:	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).
DNL/L_{dn}:	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.
L_{eq}:	Equivalent Sound Level. The sound level containing the same total energy as a time varying signal over a given sample period. L_{eq} is typically computed over 1, 8 and 24-hour sample periods.
NOTE:	The CNEL and DNL represent daily levels of noise exposure averaged on an annual basis, while L_{eq} represents the average noise exposure for a shorter time period, typically one hour.
L_{max}:	The maximum noise level recorded during a noise event.
L_n:	The sound level exceeded "n" percent of the time during a sample interval (L_{90} , L_{50} , L_{10} , etc.). For example, L_{10} 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.

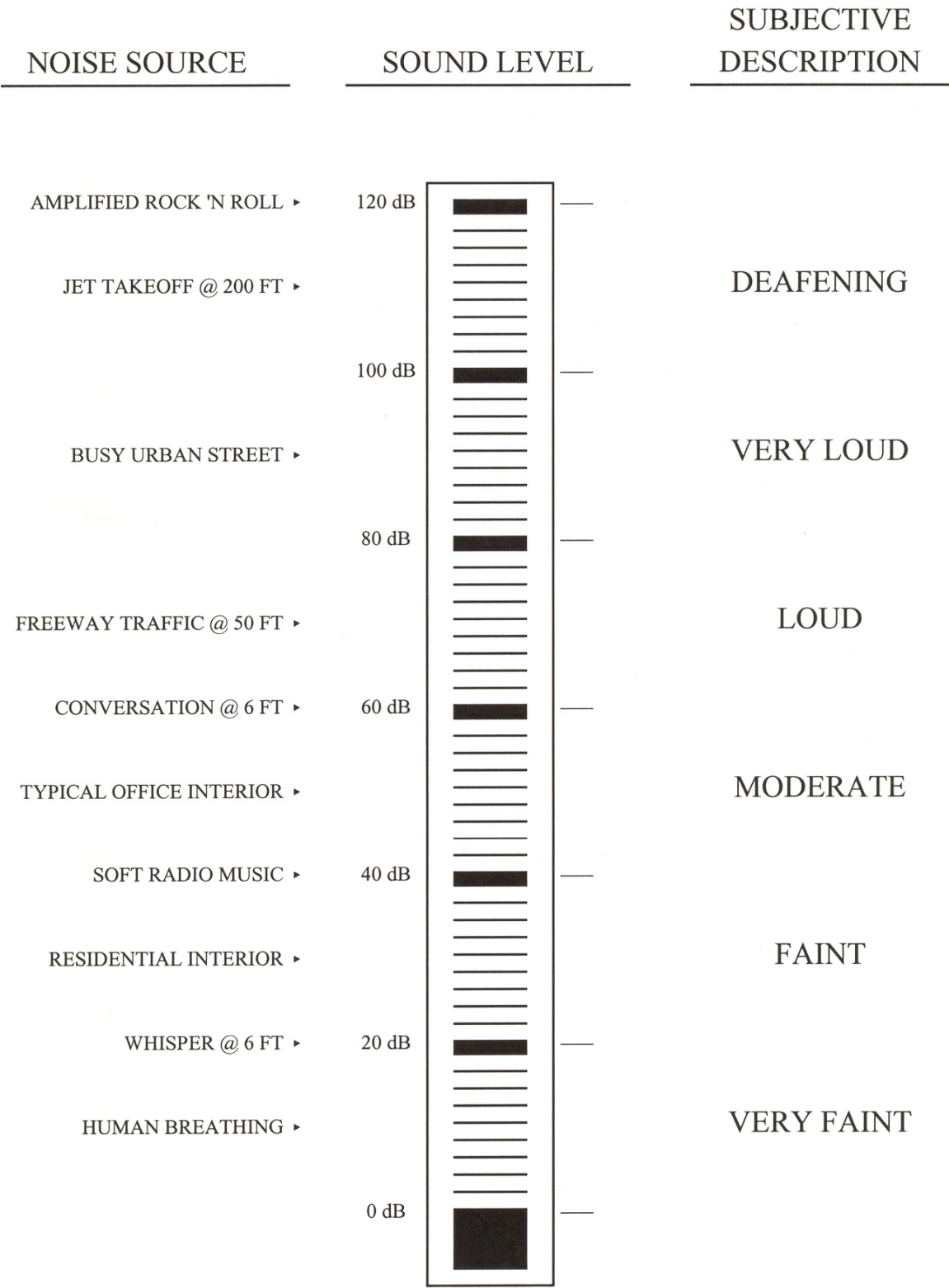
SOUND LEVEL:

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



APPENDIX C

TRAFFIC NOISE MODELING CALCULATIONS

[illegible]

Contour Levels (dB)	60	65	70	75					
----------------------------	----	----	----	----	--	--	--	--	--

WJV Acoustics, Inc
FHWA-RD-77-108
Calculation Sheets
April 30, 2024

Project #:	23-55
Description:	Existing + Project
Ldn/Cnel:	Ldn
Site Type:	Soft

Contour Levels (dB)

60	65	70	75					
----	----	----	----	--	--	--	--	--

[illegible]

WJV Acoustics, Inc
 FHWA-RD-77-108
 Calculation Sheets
 April 30, 2024

Project #:	23-55
Description:	2044 No Project
Ldn/Cnel:	Ldn
Site Type:	Soft

Contour Levels (dB)	60	65	70	75					
---------------------	----	----	----	----	--	--	--	--	--

[illegible]

WJV Acoustics, Inc
 FHWA-RD-77-108
 Calculation Sheets
 May 1, 2024

Project #:	23-55
Description:	2044 + Project
Ldn/Cnel:	Ldn
Site Type:	Soft

Contour Levels (dB)	60	65	70	75					
----------------------------	----	----	----	----	--	--	--	--	--

[illegible]