APPENDIX J

NOISE TECHNICAL REPORT

Noise Technical Report
for the
KART Transit Station
Kings County

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1.0 INTRODUCTION

This noise technical memorandum was prepared by UltraSystems to support an Initial Study (IS) and Mitigated Negative Declaration (MND) for the Kings County Area Public Transit Agency's (KCAPTA's) proposed new Kings Area Rural Transit (KART) facility on a four-acre site in downtown Hanford, California. The proposed project would include the demolition of existing structures and construction of a new transit station and commercial development. The new station would consist of an approximately 19,000-square-foot Transit Station Building, offsite parking, and onsite bus parking. The transit building includes 6,900 square feet on the first floor, 5,516 square feet on the second, and 6,557 square feet on the third floor, totaling approximately 19,000 square feet.

The proposed project includes 21 sawtooth bus bays, 17 staff parking spaces, eight secure staff parking spaces, and 105 park-and-ride spaces for transit users. Additionally, two electric bus chargers and two electric car chargers would be constructed onsite.

One objective of this memorandum is to assess the impacts of noise from project construction on neighboring residents and businesses. In addition, this technical report will estimate noise exposures to the surrounding community after project build-out. The following analysis provides a discussion of the fundamentals of sound; an examination of federal, state and local noise guidelines and policies; a review of existing conditions; an evaluation of potential noise and vibration impacts associated with the proposed project; and mitigation for identified significant or potentially significant impacts.

2.0 BACKGROUND INFORMATION

2.1 Characteristics of Sound

Sound is a pressure wave transmitted through the air. It is described in terms of loudness or amplitude (measured in decibels), frequency or pitch (measured in hertz [Hz] or cycles per second), and duration (measured in seconds or minutes). The decibel (dB) scale is a logarithmic scale that describes the physical intensity of the pressure vibrations that make up any sound. The pitch of the sound is related to the frequency of the pressure vibration. Because the human ear is not equally sensitive to all frequencies, a special frequency-dependent rating scale is used to relate noise to human sensitivity. The A-weighted decibel scale (dBA) provides this compensation by discriminating against upper and lower frequencies in a manner approximating the sensitivity of the human ear. The scale is based on a reference pressure level of 20 micropascals (zero dBA). The scale ranges from zero (for the average least perceptible sound) to about 130 (for the average human pain level).

The normal range of conversation is between 34 and 66 dBA. Between 70 and 90 dBA, sound is distracting and presents an obstacle to conversation, thinking, or learning. Above 90 dBA, sound can cause permanent hearing loss. Examples of various sound levels in different environments are shown in **Table 2.1-1** (Typical Sound Levels).

Table 2.1-1
TYPICAL SOUND LEVELS

Common Sounds	A-Weighted Sound Level in Decibels	Subjective Impression
Oxygen Torch	120	Pain Threshold
Rock Band	110	
Pile Driver at 50 feet	100	Very Loud
Ambulance Siren at 100 feet	90	
Garbage disposal	80	
Vacuum Cleaner at 10 feet	70	Moderately Loud
Air Conditioner at 100 feet	60	
Quiet Urban Daytime	50	
Quiet Urban Nighttime	40	Quiet
Bedroom at Night	30	
Recording Studio	20	Just Audible
	10	Threshold of Hearing
	0	

Sources: Aviation Planning Associates. 1978. Calculations of Maximum A-weighted Sound Levels (dBA) Resulting from Civil Aircraft Operations.

A noise environment consists of a base of steady "background" noise that is the sum of many distant and indistinguishable noise sources. Superimposed on this background noise is the sound from individual local sources. These can vary from an occasional aircraft or train passing by to virtually continuous noise from, for example, traffic on a major highway.

To the human ear, a sound 10 dBA higher than another is judged to be twice as loud; 20 dBA higher is four times as loud; and so forth. According to the U.S. Environmental Protection Agency,[1] a difference of more than 3 dBA is a perceptible change in environmental noise, while a 5-dBA difference typically causes a change in community reaction, and an increase of 10 dBA is perceived by people as doubling of loudness.

2.2 Noise Measurement Scales

Several rating scales have been developed to analyze adverse effects of community noise on people. Since environmental noise fluctuates over time, these scales consider that the effect of noise on people depends largely upon the total acoustical energy content of the noise, as well as the time of day when the noise occurs. Those that are applicable to this analysis are as follows:

- L_{eq}, the equivalent noise level, is an average of sound level over a defined time period (such as 1 minute, 15 minutes, 1 hour or 24 hours). Thus, the L_{eq} of a time-varying noise and that of a steady noise are the same if they deliver the same acoustic energy to the ear during exposure.

- L_{90} is a noise level that is exceeded 90 percent of the time at a given location; it is often used as a measure of "background" noise.

- L_{max} is the root mean square (RMS) maximum noise level during the measurement interval. This measurement is calculated by taking the RMS of all peak noise levels within the sampling interval. L_{max} is distinct from the peak noise level, which only includes the single highest measurement within a measurement interval.

- CNEL, the Community Noise Equivalent Level, is a 24-hour average L_{eq} with a 4.77-dBA "penalty" added to noise during the hours of 7:00 p.m. to 10:00 p.m., and a 10-dBA penalty added to noise during the hours of 10:00 p.m. to 7:00 a.m. to account for noise sensitivity in the evening and nighttime.[2] The logarithmic effect of these additions is that a 60-dBA 24-hour L_{eq} would result in a calculation of 66.7 dBA CNEL.

- L_{dn}, the day-night average noise, is a 24-hour average L_{eq} with an additional 10-dBA "penalty" added to noise that occurs between 10 p.m. and 7 a.m. The L_{dn} metric yields values within 1 dBA of the CNEL metric. As a matter of practice, L_{dn} and CNEL values are considered to be equivalent and are treated as such in this assessment.

2.3 Noise Attenuation

The noise level from a particular source generally declines as the distance to the receiver increases. Other factors such as the weather and reflecting or shielding also intensify or reduce the noise level at any given location. Typically, a single row of buildings between the receiver and the noise source reduces the noise level by about 5 dBA. The U.S. Department of Housing and Urban Development (HUD) has stated that exterior noise levels can normally be reduced by 15 dBA inside buildings constructed

1 Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. March. Internet: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF. Accessed October 8, 2019.

2 Technical Noise Supplement to the Traffic Noise Analysis Protocol. California Department of Transportation, Division of Environmental Analysis. September 2013, p. 2-48.

with no special noise insulation.[3] The USEPA estimates that residences in "warm" climates provide at least 12 dBA of exterior-to-interior noise attenuation with windows open and 24 dBA with windows closed.[4]

Noise from traffic on roads depends on the volume and speed of traffic and the distance from the traffic. A commonly used rule of thumb for traffic noise is that for every doubling of distance from the road, atmospheric spreading over "hard" or "soft" sites reduces the noise level by about 3 or 4.5 dBA, respectively. For a stationary source, the noise is reduced by at least 6 dBA for each doubling of distance. Further, because of the logarithmic nature of the decibel scale, a doubling of traffic on any given roadway or doubling a stationary source would cause a noise increase of approximately 3 dBA.

3 Noise Guidebook. A Reference Document for Implementing the Department of Housing and Urban Development's Noise Policy. U.S, Department of Housing and Urban Development. 1985. Internet: https://babel.hathitrust.org/cgi/pt?id=umn.31951p00994853x&view=1up&seq=5. 1985.

4 Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. U.S. Environmental Protection Agency, Office of Noise Abatement and Control. March. Internet: https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF. Accessed October 8, 2019.

3.0 PROJECT DESCRIPTION

3.1 Project Overview

The project will be built in the City of Hanford, in Kings County, California. The project site is east of Harris Street, west of Brown Street, north of East Seventh Street, and south of the alley located between Ninth Street and Eighth Street. **Figure 3.1-1** shows the regional location and **Figure 3.1-2** shows the project site and its surrounding area. The approximately four-acre project site is adjacent to parcels with commercial and light industrial uses to the south, east, and west. To the east and north are single family residential homes.

Table 3.1-1 summarizes the proposed project features, and **Figure 3.1-3** depicts the proposed project site plan.

Table 3.1-1
PROJECT SUMMARY

New Construction	Proposed Uses/Features	Area (Square Feet)	No. of Stories
Transit Station Building	First floor: central waiting area, meeting rooms, break area, training room	6,900	3
	Second floor: office space	5,516	
	Third floor: leasable office space	6,557	
	Total	18,973	
New offsite parking located north of 8th Street	Public parking spaces: Regular ADA	84 total spaces 79 spaces 5 spaces	Not Applicable
Onsite bus parking located south of 8th Street	Sawtooth bus bays	21 total bus bays	Not Applicable
	Staff parking spaces: Regular ADA	19 total spaces 17 spaces 2 spaces	
	Secure employee parking	8 total spaces	
	Public parking spaces: Regular ADA	30 total spaces 26 spaces 4 spaces	
Electric Charging Stations	Bus Chargers Car Chargers	2 Chargers 2 Chargers	Not Applicable

Source: UltraSystems, 2019

Figure 3.1-1
REGIONAL LOCATION

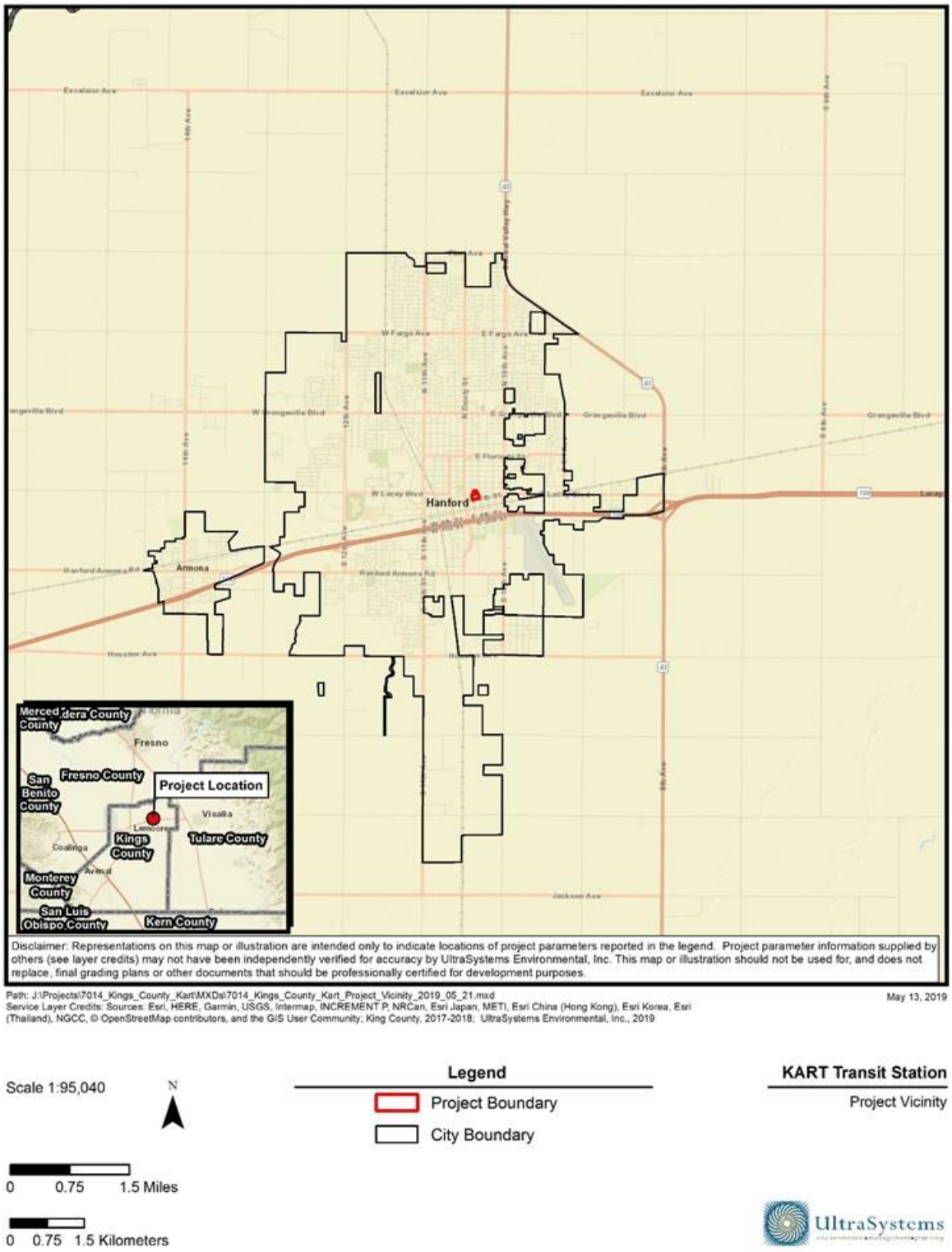
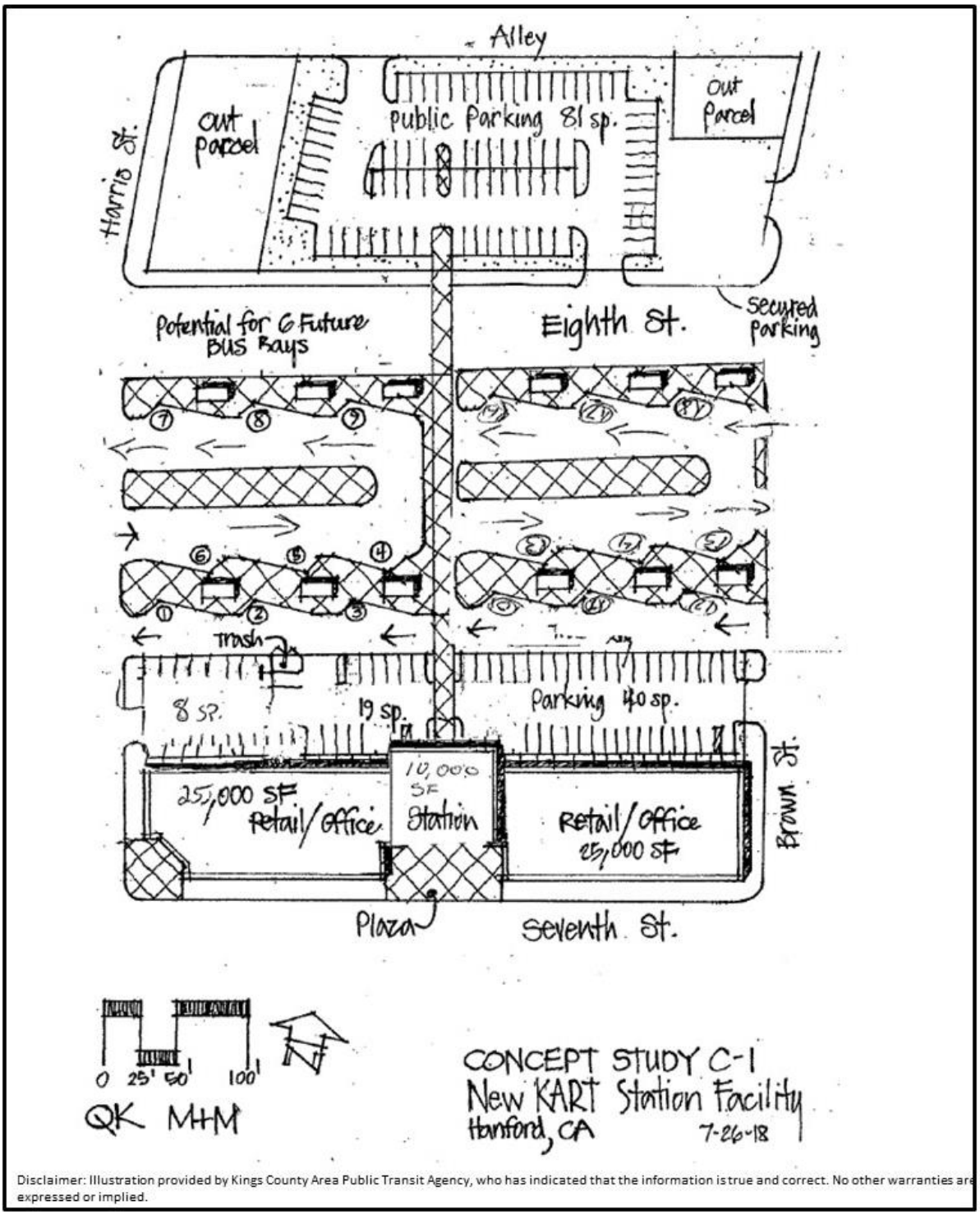


Figure 3.1-2
PROJECT SITE AND SURROUNDINGS

Figure 3.3-1
PROPOSED SITE PLAN



Disclaimer: Illustration provided by Kings County Area Public Transit Agency, who has indicated that the information is true and correct. No other warranties are expressed or implied.

Sources: Kings County Area Public Transit Agency, July 26, 2018

UltraSystems

KART Transit Station

Station Layout

3.2 Construction

After environmental analysis for the project has been completed and after property acquisition (all property between Seventh and Eighth Streets, as well as vacant properties on the north side of Eighth Street), construction/development activities would occur in the following phases: Phase I- Demolition; Phase II- Design/Build.

Project construction is anticipated to begin around July 1, 2021 and would last approximately 12 months, ending in late June 2022. **Table 3.2-1** shows the estimated construction schedule, which was prepared by UltraSystems and concurred in by KCAPTA.[5]

Table 3.2-1
ESTIMATED CONSTRUCTION SCHEDULE

Activity	Start	End	Working Days
Demolition	July 1, 2021	July 28, 2021	20
Site Preparation	July 22, 2021	July 28, 2021	5
Grading	July 29, 2021	August 9, 2021	8
Building Construction	August 10, 2021	June 12, 2022	219
Paving	June 13, 2022	June 30, 2022	14
Architectural Coating	June 13, 2022	June 30, 2022	14

3.2.1 Phase I - Demolition

Demolition would begin on the land located north of Seventh Street, south of Eighth Street, west of Brown Street, and east of Harris Street. After that, structures on the land located north of Eighth Street (up to the existing alley), west of Brown Street, and east of North Harris Street would be demolished. Eleven structures, with a combined area of about 25,104 square feet would be demolished.[6] All demolition will be complete before the next construction phases begin.

3.2.2 Phase II - Design Build

Construction would follow the schedule shown in **Table 3.2-1.** Information on construction equipment is presented in **Section 5.1**. Construction workers would park their vehicles on the project site during construction.[7]

3.3 Employment

The facility will have six onsite employees. It will also support 32 bus operators, who will use the restrooms, a break room and an outdoor lunch area.[8]

5 Email from Angie Dow, Kings County Area Public Transit Agency, Hanford, CA to Margaret Partridge, UltraSystems Environmental, Irvine, CA. July 23, 2019.
6 Demolition area estimated by UltraSystems and concurred in via email from Angie Dow, Kings County Area Public Transit Agency, Hanford, CA to Margaret Partridge, UltraSystems Environmental, Irvine, CA. July 18, 2019.
7 Email from Angie Dow, Kings County Area Public Transit Agency, Hanford, CA to Margaret Partridge, UltraSystems Environmental, Irvine, CA. September 26, 2019.
8 Email from Angie Dow, Kings County Area Public Transit Agency, Hanford, CA to Margaret Partridge, UltraSystems Environmental, Irvine, CA. March 13, 2019.

3.4 Operations

When not in use, buses will be parked at a bus yard at 610 West Davis Street in Hanford. Bus operators will park their personal vehicles at the bus yard. For the first shift, the operators will drive the buses from the bus yard to the project site, from which they will proceed to their routes. At the end of a shift, a contractor will use a shuttle to drive the operators back to the bus yard and bring the next shift's operators to the station. At the end of the last shift, the operators will return the buses to the bus yard.

Hours of operation for the transit facility and for bus operation would be from 5:30 a.m. to 11:00 p.m., Monday through Friday and from 9:30 a.m. to 5:00 p.m. on Saturday. Administrative operations would be from 7:30 a.m. to 5:30 p.m. Monday through Friday.

3.5 Existing Noise Environment

In the general area of Hanford where the KART will be located, the major sources of noise include, but are not limited to, highway traffic, street traffic and commercial activity.[9] The loudest mobile noise sources in the city are State Route (SR) 198 and other major roadways, the Hanford Municipal Airport, and the Southern Pacific (SP) and the Burlington Northern Santa Fe (BNSF) railroad lines. However, SR 198 is about 0.25 mile to the south and the SP and BNSF rail lines are about 600 feet and 0.5 mile, respectively. Numerous intervening structures block transmission of sound from these sources to the project site. Finally, the project area is more than 2,100 feet from the 60-dBA noise contour of the land use map for the airport.

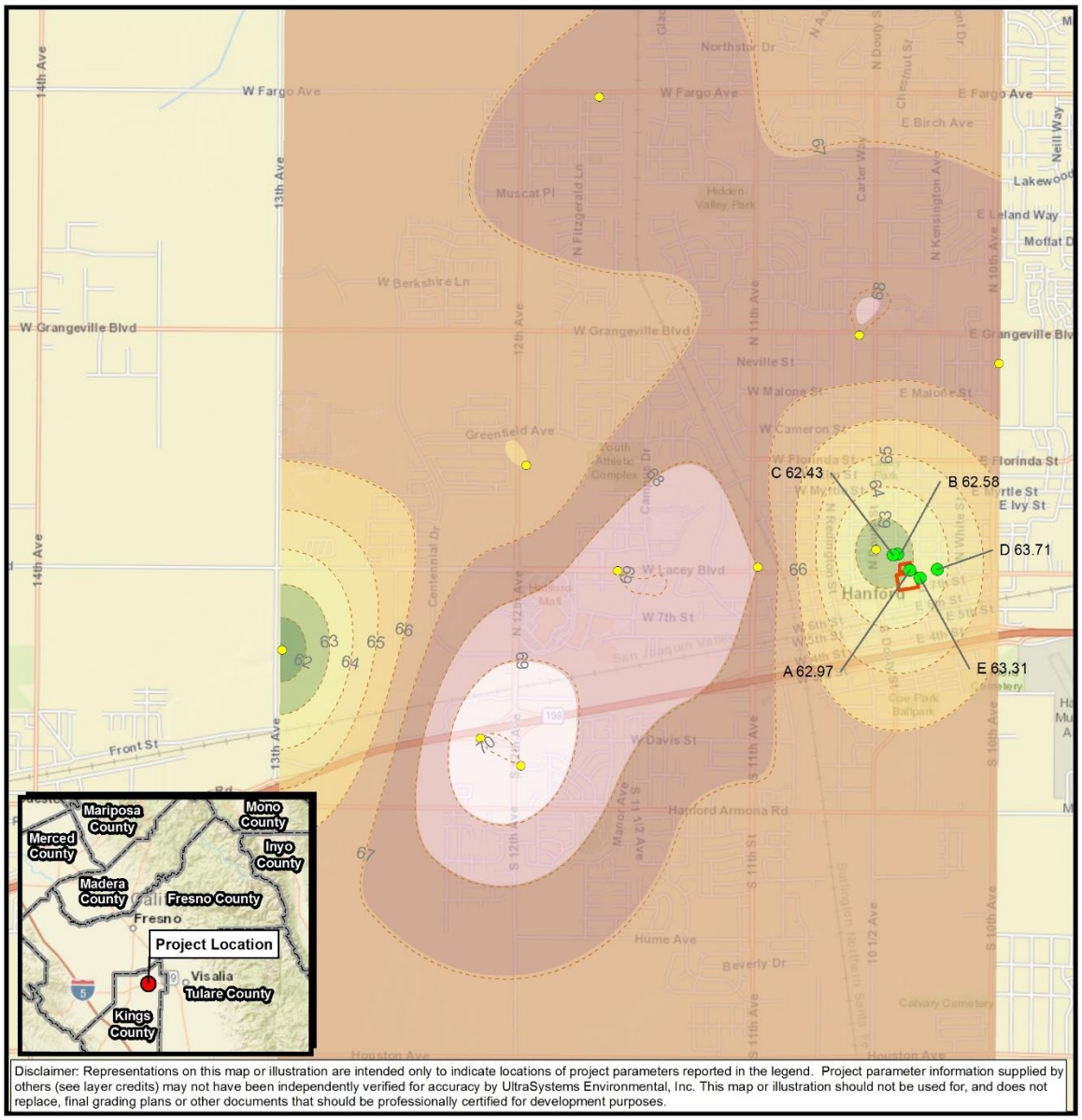
The Draft EIR for the City of Hanford 2035 General Plan Update includes the results of short-term ambient noise measurements made at 12 locations in the city on August 27, 2015.[10] As the purpose of the measurements was to gauge the contribution of street traffic to noise exposures in the city, the noise meters were placed between 20 and 90 feet of roadway centerlines. One-hour L_{eq} values ranged from 38 to 70 dBA. However, the 38-dBA value is thought to be either an anomaly or a reporting error. First, it is unusual for a daytime ambient noise value in an active urban area to be below 40 dBA. In addition, a 95-percent confidence interval for the mean of the remaining 11 noise samples is 66.0 to 70.0 dBA L_{eq}. The 38-dBA reading is clearly an outlier.

UltraSystems used GIS software with kriging to develop a grid of ambient noise values in a domain containing all 11 remaining data points. We then developed the noise contour lines shown in **Figure 3.5-1**. The use of the contours to estimate existing exposures to nearby sensitive land uses is discussed in **Section 3.7**.

9 Draft Environmental Impact Report, City of Hanford 2035 General Plan Update (SCH# 2015041024), Volume 1. Prepared by Quad Knopf, Visalia, CA for City of Hanford. July 2016, p. 4.12-7.

10 Ibid., pp. 4.12-8 and 4.12-9.

Figure 3.5-1
AMBIENT NOISE CONTOURS IN THE PROJECT AREA



3.6 Sensitive Land Uses

The City of Hanford Municipal Code § 9.10.040 defines "noise sensitive institutions" or "noise sensitive areas" as schools, churches, hospitals and other facilities at which healthcare services are provided, courts and public libraries. Although not labeled as such in the Municipal Code, residences and hotels are usually included in the sensitive receiver category.

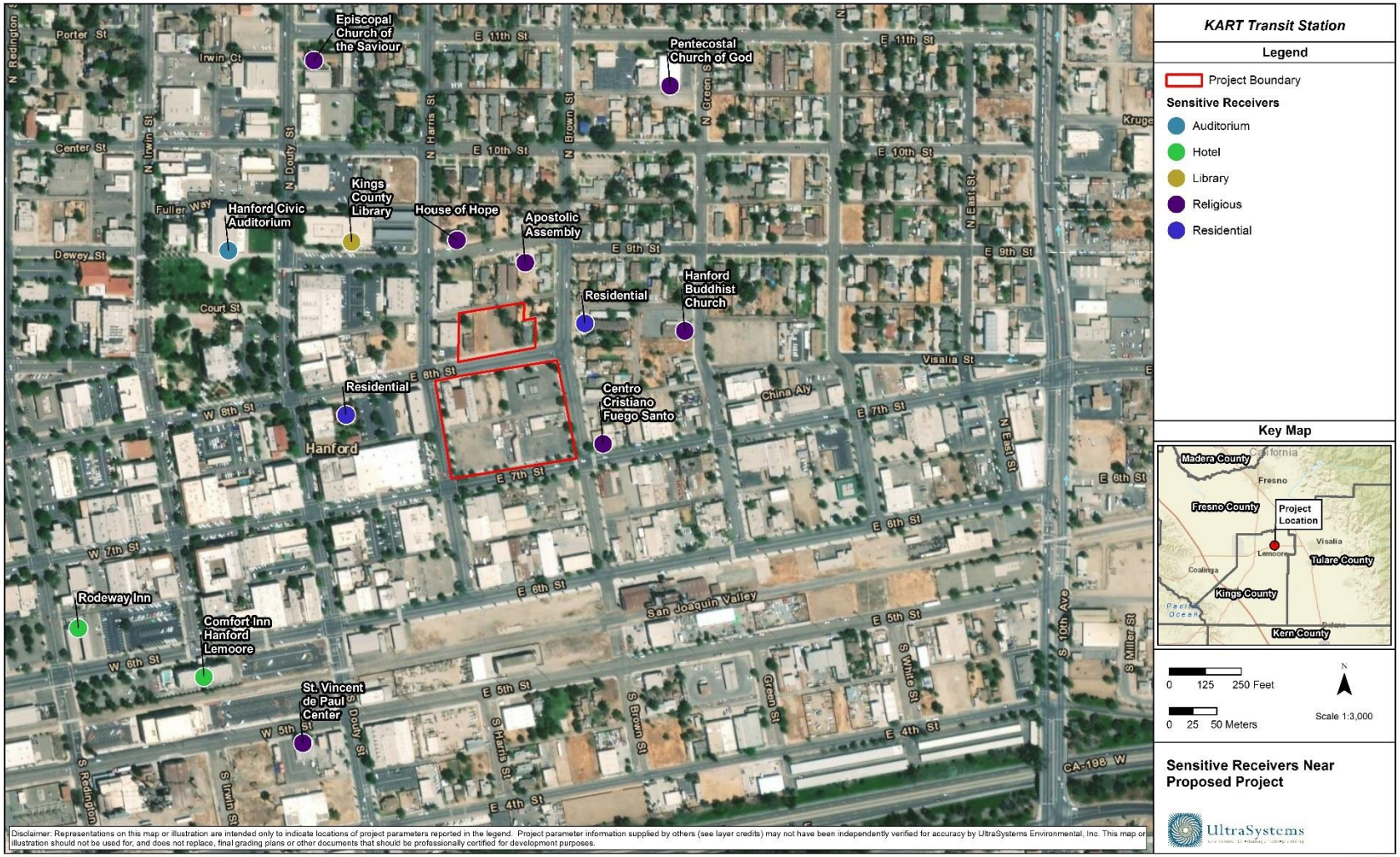
The principal existing sensitive receivers near the project are single and multifamily residences. **Table 3.6-1** identifies sensitive receivers in the project vicinity. The ones with ID numbers A through E in parentheses were used in the construction noise impact analysis in **Section 5.1**. **Figure 3.6-1** shows the locations of the sensitive receivers.

Table 3.6-1
SENSITIVE RECEIVERS IN PROJECT AREA

ID	Name	Type	Address	Feet From Site[a]
1 (**E**)	Centro Cristiano Fuego Santo	Religious	211 N Brown St	79
2 (**A**)	Single-family Residence	Residential	307 N Brown Street	163
3	Apostolic Assembly	Religious	223 E 9th St	171
4 (**B**)	House of Hope	Religious	206 E 9th St	316
5	Hanford Carnegie Museum	Museum	109 E 9th St	332
6 (**D**)	Hanford Buddhist Church	Religious	238 N Green St	475
7 (**C**)	Kings County Library	Library	401 N Douty St	513
8	Hanford Civic Auditorium	Auditorium	400 N Douty St	871
9	Pentecostal Church of God	Religious	323 E 11th S	935
10	St. Vincent de Paul Center	Religious	115 W 5th St	1,022
11	Comfort Inn Hanford Lemoore	Hotel	10 N Irwin St	1,034
12	Episcopal Church of the Savior	Religious	519 N Douty St	1,050
13	Rodeway Inn	Hotel	101 N Redington St	1,411

[a]These distances are from the sensitive receiver to the nearest point on the project boundary.

Figure 3.6-1
SENSITIVE RECEIVERS NEAR PROJECT SITE



3.7 Ambient Noise Levels

As noted in **Section 3.5**, ambient noise contours were developed from measurement data reported in the draft EIR for the City of Hanford 2035 General Plan Update. Ambient noise levels were then estimated by interpolation for five sensitive receivers in the general project area.[11] These sensitive receivers are labeled **A** through **E** in **Table 3.6-1.** The locations were chosen to provide ambient noise data to compare with the results of construction noise projections. The results of the interpolation are shown in **Table 3.7-1**.

Table 3.7-1
ESTIMATED EXISTING SHORT-TERM NOISE EXPOSURES AT SITES NEAR THE PROJECT

Site	Name	Address	Estimated 1-hr Noise
A	Single-family residence	307 N Brown Street	63.0
B	House of Hope	206 E 9th St	62.6
C	Kings County Library	401 N Douty St	62.4
D	Hanford Buddhist Church	238 N Green St	63.7
E	Centro Cristiano Fuego Santo	211 N Brown St	63.3

4.0 APPLICABLE REGULATIONS

To limit population exposure to noise levels that are physically and/or psychologically damaging or intrusive, the federal government, the State of California, various county governments, and most municipalities in the state have established noise policies, standards and ordinances.

4.1 Federal

The U.S. Department of Housing and Urban Development has set a goal of 45 dBA L_{dn} as a desirable maximum interior standard for residential units developed under HUD funding.[12] While HUD does not specify acceptable exterior noise levels, standard construction of residential dwellings constructed under Title 24 of the California Code of Regulations typically provides 20 dBA of acoustical attenuation with the windows closed and 10 dBA with the windows open. Based on this assumption, the exterior L_{dn} or CNEL should not exceed 65 dBA under normal conditions.

4.2 State of California

The California Department of Health Services (DHS) Office of Noise Control studied the correlation of noise levels with effects on various land uses. (The Office of Noise Control no longer exists.) The most current guidelines prepared by the state noise officer are contained in the "General Plan Guidelines" issued by the Governor's Office of Planning and Research in 2017 (OPR 2017). These guidelines establish four categories for judging the severity of noise intrusion on specified land uses:

- **Normally Acceptable**: Is generally acceptable, with no mitigation necessary.

11 None of the five sensitive receivers examined was part of the DEIR ambient noise data set.
12 U.S. Department of Housing and Urban Development. The Noise Guidebook. Office of Community Planning and Development. 1985. Accessible (read only) online at https://babel.hathitrust.org/cgi/pt?id=umn.31951p00994853x&view=1up&seq=8.

- **Conditionally Acceptable**: May require some mitigation, as established through a noise study.
- **Normally Unacceptable**: Requires substantial mitigation.
- **Clearly unacceptable**: Probably cannot be mitigated to a less-than-significant level.

The types of land uses addressed by the state standards, and the acceptable noise categories for each are presented in **Table 4.2-1** (Land Use Compatibility for Community Noise Sources). There is some overlap between categories, which indicates that some judgment is required in determining the applicability of the numbers in every situation.

Table 4.2-1
LAND USE COMPATIBILITY FOR COMMUNITY NOISE SOURCES

Land Use Category	*Noise Exposure (dBA, CNEL)*						
	55	*60*	*65*	*70*	*75*	*80*	
Residential – Low-Density Single-Family, Duplex, Mobile Homes							
Residential – Multiple Family							
Transient Lodging – Motel, Hotels							
Schools, Libraries, Churches, Hospitals, Nursing Homes							
Auditoriums, Concert Halls, Amphitheaters							
Sports Arena, Outdoor Spectator Sports							
Playgrounds, Neighborhood Parks							
Golf Courses, Riding Stables, Water Recreation, Cemeteries							

Land Use Category	*Noise Exposure (dBA, CNEL)*						
	55	*60*	*65*	*70*	*75*	*80*	
Office Buildings, Business Commercial and Professional							
Industrial, Manufacturing, Utilities, Agriculture							

Normally Acceptable: Specified land use is satisfactory, based upon the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply system or air conditioning will normally suffice.

Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

Clearly Unacceptable: New construction or development should generally not be undertaken.

Source: Office of Planning and Research.[13]

4.3 Local Standards

The primary regulatory documents that establish noise standards within the city of Hanford are the City of Hanford 2035 General Plan Health, Safety and Noise Element and the Hanford Municipal Code (HMC).[14]

4.3.1 General Plan Health, Safety and Noise Element

The Health, Safety and Noise Element of the City of Hanford's 2035 General Plan has two goals concerning noise:

- **Goal H7**: Protection from the harmful and annoying effect of excessive noise.
- **Goal H8:** Protection of the City's economic base by preventing incompatible land uses from encroaching upon existing or planned noise-producing uses.

13 General Plan Guidelines: State of California, Governor's Office of Planning and Research, Sacramento, California. Internet: http://opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf. Accessed August 19, 2019.

14 City of Hanford Municipal Code, Title 9 – Public Peace, Morals and Welfare, Chapter 9.10 Loud or Annoying Noises. Accessed online at https://qcode.us/codes/hanford/. Accessed August 15, 2019.

To achieve these goals, the Health, Safety and Noise Element has 13 policies, seven of which potentially apply, directly or indirectly, to the proposed project:

Policy H39 (Aircraft Noise). Evaluate proposed development proposals against the land use policies of the Kings County Airport Land Use Compatibility Plan.

Policy H40 (Ground Transportation Noise). Limit the effects of vehicle noise generation by designating truck routes, limiting vehicle speeds, standards relating to vehicle noise emission levels and muffler systems.

Policy H42 (Noise Evaluation for New Development). Evaluate proposed development proposals against existing and future noise levels from ground transportation noise sources.

Policy H44 (Noise Contours). Develop noise contours for major transportation corridors and stationary facilities that emit noise levels greater than DNL of 60 dBA.[15]

Policy H46 (Noise Ordinance). Adopt ordinances that limit noise-generating sources to acceptable, safe levels.

Policy H48 (Noise Mitigation for Construction Activities). Require all development projects to mitigate noise impacts associated with construction activities.

Policy H49 (Acoustical Analysis). The City shall utilize procedures for project review and issuance of building permits to ensure that noise mitigation measures identified in an acoustical analysis are implemented in the project design.

4.3.2 Hanford Municipal Code

The Hanford Municipal Code has several provisions that are relevant to noise during construction and operation of the KART facility. They are described as follows.

First, several HMC provisions are based upon the concept of "unreasonable noise," which the Code first defines as "any noise that is plainly audible from a distance of fifty (50) feet from any boundary line of a property from which the noise originates."[16] The Code contains a general prohibition of unreasonable noise.[17] It also prohibits "any noise which unreasonably disturbs, injures, or endangers the comfort, repose, health, peace, or safety of reasonable persons of ordinary sensitivity, within the jurisdictional limits of the city;"[18] or "any noise which is so harsh, prolonged, unnatural, or unusual in time or place as to occasion unreasonable discomfort to any persons within the neighborhood from which said noise emanates, or as to unreasonably interfere with the peace and comfort of neighbors or their guests, or operators or customers in places of business, or as to detrimentally or adversely affect such residences or places of business."[19]

The HMC finds that "Certain short-term easing of noise restrictions is essential to allow the construction and maintenance of structures, infrastructure and other elements necessary for the

15 DNL is assumed here to mean L_{dn}, as defined in **Section 2.2**.
16 HMC § 9.10.040.
17 HMC § 9.10.050(A)(1).
18 HMC § 9.10.050(A)(2).
19 HMC § 9.10.050(A)(3).

physical and commercial vitality of the city."[20] Thus there are no express, quantifiable limitations on construction noise. Nevertheless, construction activities are confined to 7:00 a.m. to 8:00 p.m.[21] A construction contractor may apply to the City for a permit to do construction work outside of those hours, "if the city manager, or designee, determines that the public health and safety … will not be impaired, and if the city manager, or designee, further determines that loss or inconvenience would otherwise result."[22] Permits are good for up to three days but can be renewed for up to three days at a time.

4.4 Thresholds of Significance for this Analysis

Two criteria were used for judging noise impacts. First, noise levels generated by the proposed project must comply with all relevant federal, state, and local standards and regulations. Noise impacts on the surrounding community are limited by local noise ordinances, which are implemented through investigations in response to nuisance complaints. It is assumed that all existing regulations for the construction and operation of the proposed project will be enforced. In addition, the proposed project should not produce noise levels that are incompatible with adjacent noise sensitive land uses.

The second measure of impact used in this analysis is a significant increase in noise levels above existing ambient noise levels as a result of the introduction of a new noise source. An increase in noise level due to a new noise source has a potential to adversely impact people. The proposed project would have a significant noise impact if it would do any of the following:

- Expose persons to or generate long-term noise levels (as CNEL) in excess of standards recommended in the state's land use compatibility table.
- Include construction activities outside of the allowed construction times.
- Increase short-term noise exposures at sensitive receivers during construction by 5 dBA L_{eq} or more.
- Contribute, with other local construction projects, to a significant cumulative noise impact.
- Increase operational exposures at sensitive receivers (mainly because of an increase in traffic flow) by 5 dBA CNEL or more.

20 HMC § 9.10.010(D).
21 HMC § 9.10.060(A)(10).
22 Ibid.

5.0 PROJECT IMPACTS

Noise impacts associated with new facility developments include short-term and long-term impacts. Construction activities, especially heavy equipment operation, would create noise effects on and adjacent to the construction site. Long-term noise impacts include project-generated onsite and offsite operational noise sources. Onsite (stationary) noise sources from the KART would include movement of buses into and from the station, air conditioners, landscaping and building maintenance. Offsite noise would be attributable to project-induced traffic, which would cause an incremental increase in noise levels within and near the project vicinity.

This section also evaluates potential groundborne vibration that would be generated from the construction or operation of the proposed project.

5.1 Short-Term Noise Impacts

The construction of the proposed project may generate temporary increases in ambient noise levels that exceed the thresholds of significance for this analysis. Noise impacts from construction activities are a function of the noise generated by the operation of construction equipment and on-road delivery and worker commuter vehicles, the location of equipment, and the timing and duration of the noise-generating activities. For the purpose of this analysis, it was estimated that the construction of the proposed project would begin with demolition of existing structures in early July 2021 and finish in late June of 2022.

The types and numbers of pieces of equipment anticipated in each phase of construction and development were estimated using the California Emissions Estimator Model (CalEEMod), Version 2016.3.2[23] and UltraSystems' experience with similar projects. Details of the equipment assumptions are in the air quality technical study for this project.[24]

Table 5.1-1 lists the equipment expected to be used. For each equipment type, the table shows an average noise emission level (in dB at 50 feet, unless otherwise specified) and a "usage factor," which is an estimated percentage of operating time that the equipment would be producing noise at the stated level.[25] Equipment use was matched to phases of the construction schedule. The last column of the table shows the composite noise at 50 feet for each phase; i.e., the total noise if all of each phase's equipment were to operate simultaneously.

Using calculation methods published by the Federal Transit Administration,[26] UltraSystems estimated the average hourly exposures at sensitive receiver sites A through E. To account for the fact that at any given time the various pieces of construction equipment are at different places, the distances used for the calculation were those from the center of each major construction area (north

23 California Emissions Estimator Model. User's Guide, Version 2016.3.2. Prepared by BREEZE Software for the California Air Pollution Control Officers Association, in collaboration with South Coast Air Quality Management District. 2017

24 Air Quality/Greenhouse Gas Technical Report for the KART Transit Station, Kings County. Prepared by UltraSystems Environmental Inc., Irvine, CA for Kings County Area Public Transit Agency, Hanford, CA. September, 2019.

25 Equipment noise emissions and usage factors are from Knauer, H. et al., 2006. FHWA Highway Construction Noise Handbook. U.S. Department of Transportation, Research and Innovative Technology, Administration, Cambridge, Massachusetts, FHWA-HEP-06-015 (August 2006), except where otherwise noted.

26 Transit Noise and Vibration Impact Assessment Manual. Federal Transit Administration, Office of Planning and Environment, Washington, DC, FTA Report No. 0123. September 2018. Internet: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf.

and south of East Eighth Street) to each ambient noise measurement point. Results are shown in **Table 5.1-2**.

Table 5.1-1
CONSTRUCTION EQUIPMENT NOISE CHARACTERISTICS

Construction Phase	Equipment Type	Maximum Sound Level (dBA @ 50 feet)	Usage Factor	Composite Noise (dBA @ 50 feet)
Demolition	Concrete/Industrial Saw	90	0.2	**85.8**
	Tractor/Loader/Backhoe	85	0.37	
	Excavators	80	0.4	
	Rubber-Tired Dozer	79	0.4	
Site Preparation	Rubber-Tired Dozer	79	0.4	**87.5**
	Tractor/Loader/Backhoe	85	0.37	
Grading	Graders	85	0.41	**87.4**
	Rubber-Tired Dozer	79	0.4	
	Excavators	80	0.4	
	Tractor/Loader/Backhoe	85	0.37	
Building Construction	Crane	83	0.29	**86.4**
	Forklift	67	0.2	
	Generator Set	73	0.5	
	Tractor/Loader/Backhoe	85	0.37	
	Welder	74	0.45	
Paving	Cement and Mortar Mixer	85	0.4	**88.8**
	Pavers	77	0.5	
	Paving Equipment	85	0.5	
	Rollers	80	0.2	
	Tractor/Loader/Backhoe	85	0.37	
Architectural Coating	Air Compressors	81	0.48	**77.8**

Table 5.1-2
ESTIMATED UNSHIELDED CONSTRUCTION NOISE EXPOSURES AT NEAREST SENSITIVE RECEIVERS

Site	Sensitive Receiver	Distance (feet)	1-Hour L_{eq} (dBA)		
			Existing	Projected[a]	Change
For Construction Activity North of East 8th Street					
A	Single-family residence	172	63.0	78.1	+15.1
B	House of Hope	343	62.6	72.5	+9.9
C	Kings County Library	391	62.4	71.5	+9.1
D	Hanford Buddhist Church	711	63.7	67.8	+4.1
For Construction Activity South of East 8th Street					
E	Centro Cristiano Fuego Santo	391	63.3	72.6	+9.3
A	Single-family residence	316	63.0	73.1	+10.1
B	House of Hope	640	62.6	68.1	+5.5
C	Kings County Library	662	62.4	67.8	+5.4
D	Hanford Buddhist Church	715	63.7	67.8	+4.1
E	Centro Cristiano Fuego Santo	281	63.3	74.2	+10.9

[a]Existing plus construction-related.

For sensitive receivers B, C and D, at least one existing building is on a line of sight between the construction noise source and a receiver. According to Caltrans, in cases where the first row of buildings covers less than about 60% of the field of view, the first row attenuates the noise by about 3 dBA, with 1.5 dBA for each additional row.[27] Where the coverage exceeds 60%, the first building attenuates about 5 dBA, with 1.5 dBA for each additional row. The attenuation from intervening structures was used to adjust the increases in exposures. **Table 5.1-3** shows the results.

Table 5.1-3
ADJUSTED CONSTRUCTION NOISE EXPOSURE INCREASES AT NEAREST SENSITIVE RECEIVERS

Sensitive Receiver	Increase Due to Construction 1-Hour L_{eq} (DBA)	
	Activity North of East 8th Street	Activity South of East 8th Street
A	**15.1**	**10.1**
B	**9.9**	3.5
C	**6.6**	2.7
D	1.8	1.3
E	**9.3**	**10.9**

At all sensitive receivers except D, the *increase* in exposure would, for at least part of construction, exceed the 5-dBA L_{eq} significance threshold defined in **Section 4.4** of this report. Implementation of mitigation measures described in **Section 7.0** of this report will ensure that impacts from construction noise will be less than significant.

27 Technical Noise Supplement to the Traffic Noise Analysis Protocol. California Department of Transportation, Division of Environmental Analysis. September 2013, p. 2-35.

5.2 Long-Term Noise Impacts

5.2.1 Noise from Onsite Sources

Onsite noise sources from the proposed KART project would include bus maneuvering and parking, externally placed air conditioners, landscaping and building maintenance equipment; and motor vehicles driving into, within, and out of the parking areas. The new station building will block most of the noise transmission toward the south. Noise from onsite sources would be less than significant.

5.2.2 Roadway Noise

The principal noise source in the project area is traffic on local streets. The project may contribute to a permanent increase in ambient noise levels in the project vicinity due to project-generated vehicle traffic on neighborhood roadways and at intersections. A noise impact would occur if the project contributes to a permanent increase in ambient noise levels affecting sensitive receivers along roadways that would carry project-generated traffic.

According to the transportation impact analysis (TIA) prepared for this project,[28] the project will generate about 760 net[29] bus and other passenger vehicle trips per day. The weekday AM and PM peak traffic volumes are predicted to be 82 and 99 vehicles per hour, respectively. To obtain an idea of the magnitude of the increase in local traffic due to the project, the AM and PM peak hour project-generated traffic was compared to the existing traffic at six of the TIA's study intersections. **Table 5.2-1** shows the result of the analysis. The highest traffic increase through an intersection would be 75%. The remaining increases would range from 0% to 31.0%.

Table 5.2-1
PERCENTAGE TRAFFIC INCREASE DUE TO PROJECT

TIA Intersection	AM Peak Vehicles/Hour		Percent Increase	PM Peak Vehicles/Hour		Percent Increase
	Baseline	Project		Baseline	Project	
N. Harris St./ 7th Street	372	27	7.3	589	0	0
N. Harris St./ E. 8th Street	163	19	11.7	207	17	8.2
N. Brown St./ 7th Street	329	42	12.8	299	33	11.0
N. Brown St./ 8th Street	44	33	75.0	58	18	31.0
10th Ave/7th Street/ Lacey Blvd.	1,209	13	1.1	1,796	9	0.5
N. 11th Avenue/ 7th Street	1,412	40	2.8	2,395	71	3.0

Source: Traffic data from KART Transit Center. Administrative Draft Transportation Impact Assessment, Figure 3 and Figure 5.

28 KART Transit Center. Administrative Draft Transportation Impact Assessment. Prepared by Fehr & Peers for Kings County Area Public Transit Agency and UltraSystems Environmental. September 2019.

29 The transportation impact analysis estimated traffic to be generated by the project and then subtracted project from existing uses that will be displaced by the new KART facility.

Given the logarithmic nature of the decibel, traffic volume needs to be doubled in order for the noise level to increase by 3 dBA,[30] the minimum level perceived by the average human ear. A doubling is equivalent to a 100% increase. Because the maximum increase in traffic at any intersection would be below 100%, operational traffic noise impacts on sensitive receivers would be less than significant.

Noise impacts to businesses and residences from transit vehicles entering and leaving the facility at many hours of the day and night were also estimated. Because the new station will be at some remove from the current location, new streets will receive the bus traffic. Therefore, the analysis included both the current bus traffic and the forecasted increase, essentially a doubling of existing traffic. From information provided by KCAPTA,[31] it appears that the bus traffic into and out of the new facility will be divided roughly evenly among four streets: East Eighth Street, North Brown Street, East Seventh Street, and North Harris Street. In a given hour the bus traffic would be the present number of vehicles per hour multiplied by two and divided by four. Exposures to bus noise were estimated by the sound exposure level (SEL) method prescribed by the Federal Transit Administration.[32] Vehicle data and the noise analysis are shown in **Table 5.2-2**. For exposures at 50 feet from the centerlines of each of the four aforementioned streets, the hourly L_{eq} values due to bus traffic would range from about 40 dBA to about 53 dBA. These values are about 10 dBA below the local ambient noise levels estimated in **Section 3.7**. The increase in hourly average noise exposure due to the bus traffic would be less than 1 dBA, which would not be noticeable. The calculated CNEL value is 51.6 dBA, which is in the "normally acceptable" range for the types of sensitive receivers in the area. (See **Table 4.2-1**.) Because the nearest sensitive receivers are more than 50 feet away, actual exposures would be less than 51.6 dBA CNEL.

30 Technical Noise Supplement. Prepared by ICF Jones & Stokes, Sacramento, California for California Department of Transportation, Division of Environmental Analysis, Sacramento, California. November 2009, p. 2-12.

31 Data provided in email from Angie Dow, Kings County Area Public Transit Agency, Hanford, CA to Michael Rogozen, UltraSystems Environmental, Irvine, CA. September 25, 2019.

32 Transit Noise and Vibration Impact Assessment Manual. FTA Report NO. 0123. Federal Transit Administration, Office of Planning and Environment, Washington, DC. September 2018, pp. 78-81.

Table 5.2-2
BUS TRAFFIC NOISE IMPACTS AT 50 FEET

Starting Hour	CNEL Calculation			
	Buses on Each Street[a]	1-Hour L_{eq} (dBA)	CNEL Weighting	Adjusted L_{eq} (dBA
0000	0	0	10	10
0100	0	0	10	10
0200	0	0	10	10
0300	0	0	10	10
0400	0	0	10	10
0500	1	40.4	10	50.4
0600	9	50.0	10	60.0
0700	13	51.6	0	51.6
0800	17	52.7	0	52.7
0900	14	51.9	0	51.9
1000	13	51.6	0	51.6
1100	14	51.9	0	51.9
1200	14	51.9	0	51.9
1300	14	51.9	0	51.9
1400	14	51.9	0	51.9
1500	14	51.9	0	51.9
1600	12	51.2	0	51.2
1700	15	52.2	0	52.2
1800	14	51.9	0	51.9
1900	6	48.2	4.77	53.0
2000	6	48.2	4.77	53.0
2100	3	45.2	4.77	50.0
2200	0	0	10	10
2300	0	0	10	10
			dBA CNEL	**51.6**

5.3 Vibration Impacts

Vibration is sound radiated through the ground. Groundborne noise is the rumbling sound caused by the vibration of building interior surfaces. The ground motion caused by vibration is measured as peak particle velocity (PPV) in inches per second and is referenced as vibration decibels (VdB). Typical outdoor sources of perceptible groundborne vibration are construction equipment and traffic on rough roads.

The American National Standards Institute[33] indicates that vibration levels in critical care areas, such as hospital surgical rooms and laboratories, should not exceed 0.2 inch per second of PPV. The FTA also uses a PPV of 0.2 inch per second as a vibration damage threshold for fragile buildings and a PPV of 0.12 inch per second for extremely fragile historic buildings.[34] The FTA criteria for infrequent groundborne vibration events (less than 30 events per day) that may cause annoyance are 80 VdB

33 Guide to the Evaluation of Human Exposure to Vibration in Buildings: American National Standards Institute, ANSI S.329-1983. 1983.

34 Transit Noise and Vibration Impact Assessment Manual. Federal Transit Administration, Office of Planning and Environment, Washington, DC, FTA Report No. 0123. September 2018, p. 186.

for residences and buildings where people normally sleep, and 83 VdB for institutional land uses with primarily daytime use.

5.3.1 Construction Vibration

It is expected that groundborne vibration from project construction activities would cause only intermittent, localized intrusion. The project's construction activities most likely to cause vibration impacts are:

- **Heavy Construction Equipment:** Although all heavy, mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to buildings, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate closely enough to any sensitive receivers to cause vibration impact.

- **Trucks:** Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes almost always eliminates the problem.

The project would not include any blasting, drilling, or pile driving. Construction equipment such as loaded trucks, jack hammers, and small bulldozers may temporarily increase groundborne vibration or noise at the project site.

The construction vibration analysis used formulas published by the Federal Transit Administration.[35] For a standard reference distance of 25 feet, peak particle velocity is found from:

$$PPV = PPV_{ref} \times (25/D)^{1.5}$$

where

PPV_{ref} = Reference source vibration at 25 feet

D = Distance from source to receiver

The vibration level (VdB) for a standard reference distance of 25 feet is found from:

$$VdB = L_{vref} - 30 \log(D/25)$$

where

L_{vref} = Reference source vibration level at 25 feet

D = Distance from source to receiver

The FTA has published standard vibration levels for construction equipment operations, at a distance of 25 feet.[36] The smallest distance from construction activity to a residential receiver

35 Ibid., p. 185.
36 Ibid., p. 184.

would be about 172 feet. The calculated vibration levels expressed in VdB and PPV for selected types of construction equipment at distances of 25 and 172 feet are listed in **Table 5.3-1**.

Table 5.3-1
VIBRATION LEVELS OF TYPICAL CONSTRUCTION EQUIPMENT

Equipment	PPV at 25 feet (in/sec)	Vibration Decibels at 25 feet (VdB)	PPV at 172 feet (in/sec)	Vibration Decibels at 172 feet (VdB)
Loaded trucks	0.076	86	0.004	61
Jack hammer	0.035	79	0.002	54
Small bulldozer	0.003	58	0.0002	33

As shown in **Table 5.3-1**, the vibration level of construction equipment at the nearest sensitive receiver (172 feet) is at most 0.004 inch per second, which is less than the FTA damage threshold of 0.12 inch per second PPV for fragile historic buildings, and 61 VdB, which is less than the FTA threshold for human annoyance of 80 VdB. Construction vibration impacts would therefore be less than significant.

5.3.2 Operational Vibration

Operation of the proposed project would not involve significant sources of groundborne vibration or groundborne noise. Thus, operation of the proposed project would result in a less than significant impact.

6.0 CUMULATIVE IMPACTS

6.1 Construction Noise

The City of Hanford Community Development Department, Planning Division does not show any current or near-term future developments that would be build close enough to the KART site to add to noise exposures from the KART project.[37] Therefore, the short-term cumulative noise impact would be less than significant.

6.2 Operational Noise

As discussed in **Section 5.2.2**, noise from project-induced traffic is not projected to increase by a noticeable amount at nearby sensitive receivers within the planning horizon. These projections include cumulative traffic from the project and other proposed projects. Therefore, cumulative impacts from the proposed project would be less than significant.

37 Current Projects, City of Hanford, California, Community Development Department, Planning Division. https://www.cityofhanfordca.com/departments/community_development/planning_division/current_projects.php. Accessed October 7, 2019.

7.0 MITIGATION MEASURES

The following mitigation measures will reduce short-term construction impacts to a less than significant level.

MM N-1 If surrounding residents or businesses complain of excessive noise during construction, then the construction contractor will conduct noise monitoring in the residential or commercial area of concern during the suspected noise-producing construction activities. If the monitored noise levels exceed background levels by 5 dBA or more, then the construction contractor will mitigate noise levels using temporary noise shields, noise barriers or other mitigation measures to comply with those restrictions or standards. (See below.)

MM N-2 The construction contractor will use the following **source controls**, except where not physically feasible:

- Use of noise-producing equipment will be limited to the interval from 7 a.m. to 6 p.m., Monday through Friday.
- For all noise producing equipment, use types and models that have the lowest horsepower and the lowest noise generating potential practical for their intended use.
- The construction contractor will ensure that all construction equipment, fixed or mobile, is properly operating (tuned-up) and lubricated, and that mufflers are working adequately.
- Have only necessary equipment onsite.
- Use manually-adjustable or ambient sensitive backup alarms

MM N-3 The contractor will use the following path controls, except where not physically feasible:

- Install portable noise barriers, including solid structures and noise blankets, between the active noise sources and the nearest noise receivers.
- Temporarily enclose localized and stationary noise sources.
- Store and maintain equipment, building materials, and waste materials as far as practical from as many sensitive receivers as practical.

MM N-4 Advance notice of the start of construction shall be delivered to all noise sensitive receivers adjacent to the project area. The notice shall state specifically where and when construction activities will occur, and provide contact information for filing noise complaints with the contractor and the City.

8.0 IMPACTS AFTER MITIGATION

After implementation of the mitigation measures presented in **Section 7.0**, noise exposures will be less than significant.