

## **Appendix F**

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Noise Impact Assessment



**NOISE IMPACT ANALYSIS**  
**REYNOLDS RANCH**  
**CITY OF LODI, CALIFORNIA**

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## **NOISE SETTING**

### **NOISE DESCRIPTORS**

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The unit of sound pressure ratioed to the lowest sound level detectable by a young person with good auditory acuity is called a decibel (dB). Because sound or noise can vary in intensity by over one million times within the range of human hearing, decibels are a logarithmic progression used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity are factored more heavily into sound descriptions in a process called "A-weighting" written as dBA. Any further reference to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are normally expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL).

### **NOISE STANDARDS**

The City of Lodi has established guidelines for acceptable community noise levels that are based upon the CNEL rating scale. The guidelines rank noise/land use compatibility in terms of four noise level categories; "presumed to be acceptable" (required no mitigation), "conditionally acceptable" (with acceptability depending on the land use and the extent of mitigation required), "normally unacceptable" (new construction or development should be discouraged, although mitigation may be possible), and "presumed to be unacceptable" (mitigation measures unlikely to be available). The City of Lodi noise/land use compatibility guidelines have been used as the evaluation criteria for land uses that may be affected by the proposed project.

CNEL-based standards are used to make land use decisions as to the suitability of a given site for its intended use. They apply to those noise sources not amenable to local control such as on-road traffic, aircraft, trains, etc. Because cities cannot regulate the noise created by such sources, they control the types of land use or levels of mitigation required by the receiving property. The noise compatibility standards for Lodi are shown in Figure 1.

**Figure 1**

**Land Use Compatibility Standards  
City of Lodi**

|   | Land Use Compatibility by Outdoor L <sub>dn</sub> or CNEL Value |          |  |   |          |          |            | Supplemental Indoor Noise Criteria (Outdoor Noise Sources)    |
|---|---|----------|--|---|----------|----------|------------|---|
|   | Below 55 dB   | 55-60 dB | 60-65 dB   | 65-70 dB  | 70-75 dB | 75-80 dB | Over 80 dB |   |
| Residential, including Apartments and Mobile Homes  |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Ldn or CNEL <45 dB in sleeping quarters                       |
| Motels, Hotels, Other Transient Lodgings, Hospitals, and Convalescent Facilities                |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Ldn or CNEL <45 dB in sleeping quarters                       |
| Schools, Libraries, Churches, and Meeting Halls   |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Leq >40 dBA for the noisiest our of the day                   |
| Theaters, Auditoriums, and Concert Halls  |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Leq <35 dBA for the noisiest hour of the day                  |
| Business Offices, Medical and Dental Offices, Retail and Wholesale Facilities                   |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Ldn or CNEL <50 dB in fully enclosed portions of the building |
| Manufacturing and Other Industrial Facilities   |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Indoor criteria for outdoor noise sources not applicable      |
| Sports Areas, Amusement Parks, and Outdoor Spectator Sports                                     |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Indoor criteria for outdoor noise sources not applicable      |
| Parks, Playgrounds, Golf Courses, Riding Stables, Outdoor Amphitheaters, and Passive Open Space |   |          | Presumed To Be Acceptable; no special noise mitigation required. | Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text. |          |          |            | Indoor criteria not applicable                                |

Presumed To Be Acceptable; no special noise mitigation required.

Normally Unacceptable; acceptability requires specific findings outlined in Policy A-1 of the Noise Element text.

Conditionally Acceptable; acceptability depends on specific property uses and the extent of noise mitigation provided.

Presumed To Be Unacceptable; adequate mitigation measures unlikely to be available.

**Notes:** CNEL criteria apply to outdoor noise from sources that operate continuously or that operate frequently throughout most of a 24-hour period.

CNEL criteria should be applied to noise conditions that are typical for the noise source, not to conditions reflecting temporary peak activity periods.

Land use compatibility classifications for areas affected primarily by intermittent or discontinuous noise sources must be made on a case-by-case basis, reflecting the magnitude, duration, and temporal pattern of ambient noise.

Supplemental indoor noise criteria represent minimum performance standards to be met through building design and acoustic insulation.

Source: City of Lodi General Plan Section 6. Noise Element.

The noise/land use compatibility standards considers exterior exposures up to 60 dB CNEL “presumed to be acceptable” for residential use, and exposures of 60-65 dB CNEL are “conditionally acceptable”. For commercial uses proposed in this project, average daily noise levels of up to 65 dB CNEL are “presumed to be acceptable”. Exterior levels up to 75 dB CNEL are considered “conditionally acceptable” for office or retail uses. Because such uses rarely have any usable space (except perhaps for a courtyard or dining patio), ambient noise levels are typically not siting issues for offices or stores. Schools are considered “presumed to be acceptable” with exterior noise levels of up to 60 dB CNEL and 60-70 dB CNEL are “conditionally acceptable”.

The Lodi Municipal Code also addresses interior noise levels through extension of the State Noise Insulation Standards (California Code of Regulations, Title 24) and Chapter 35 of the Uniform Building Code to all new convalescent facilities, hospitals, and single-family residential developments, in addition to the multifamily and transient lodging developments already covered by the State Noise Insulation Standards. A 45 dB CNEL interior exposure is required for single and multi-family residential uses for the City of Lodi.

For purposes of this analysis, an exterior level of up to 65 dBA CNEL will be allowed for residential use provided exterior noise levels have been substantially mitigated through as reasonable application of the best available noise reduction technology and interior noise exposure does not exceed 45 dBA CNEL with windows and doors closed. Requiring that windows and doors remain closed to achieve an acceptable interior noise level will necessitate the use of air conditioning and/or mechanical ventilation. The City of Lodi noise standards do not address retail/commercial interior noise levels.

CNEL-based standards are the land use planning standards that are applied to noise sources for which the City of Lodi is pre-empted from exercising local control. Those noise sources that are amenable to local control are regulated by the City of Lodi Municipal Code. The ordinances therein establish allowable levels of sound that may cross any adjacent property line, as well as prohibiting general nuisance noise and identifying a number of specific prohibitions. The City of Lodi Municipal Code regulations relevant to this project include:

- 9.24.020 a. General Noise Regulations. Notwithstanding any other provision of this chapter, and in addition thereto, it is unlawful for any persons to willfully make or continue or permit or cause to be made or continued, any loud, unnecessary or unusual noise which unreasonably disturbs the peace and quiet of any neighborhood or which causes discomfort or annoyance to any reasonable person of normal noise sensitivity.
- 9.24.030 c. It is unlawful for any person, firm or corporation to cause, permit or generate any noise or sound as described herein between the hours of 10:00 p.m. and 7:00 a.m. which exceeds the ambient noise levels at the property line of any residential property as determined at the time of such reading by more than five decibels. This section shall be applicable whether such noise or sound is of a commercial or noncommercial nature.

The City of Lodi Municipal Code exempts any sound equipment that has a valid City license or permit. Construction activities would need authorization under City issuance of construction permits before any work could commence on-site. The municipal code does not establish the

time period that this exempted activity may occur. However, limits to construction hours would be determined in the special provisions for construction activities by the City Building Inspector.

## **BASELINE NOISE LEVELS**

Existing noise levels around the project vicinity derive almost exclusively from vehicular sources on the streets throughout the area, particularly adjacent SR-99, and the Union Pacific railroad (operations are currently conducted by Burlington Northern). In order to better define the existing noise environment in the project vicinity, a 24-hour noise measurement program was conducted on March 9-10, 2006. On-site noise measurements were made at three locations. One meter was placed between the second and third house just south of Harney Lane at the north of the site. Another meter was placed at the southwest corner of the parcel near the train tracks. The third meter was placed at the northeastern perimeter of the site, only 18 yards to the fence bordering Highway 99. Table 1 summarizes the measurement results.

The City of Lodi exterior noise standard for residential use is 65 dBA CNEL. The measured noise levels along the railroad tracks are already excessive in terms of City of Lodi standards by a large margin. The peak noise levels close to the tracks occur late at night when track utilization is highest. Every train from 10 p.m. to 7 a.m. is the "noise equivalent" of ten daytime trains in calculating CNEL. The weighted CNEL is therefore 4 dB higher than even the noisiest hours of the day which occur around midnight and from 5-6 a.m. Any homes adjacent to the tracks will require either distance separation from the tracks or a noise wall.

The measured noise data shows that areas adjacent to SR-99 also substantially exceed City standards. As near the railroad, the high percentage of nocturnal traffic, especially heavy trucks, creates a CNEL that is several dB higher than the noisiest hour of the day. However, this area has a planned commercial use and will not have any residential receivers.

The measured noise levels are already excessive in terms of City of Lodi standards for noise sensitive land uses. Any usable outdoor space at the nearest homes without noise walls facing Harney Lane, the railroad tracks, or that are adjacent to SR-99 are already noise impacted. Interior noise levels are likely also high, unless windows are tightly closed and central air conditioning is used on warmer days. Any modified roadway geometries or increased traffic volumes due to projected traffic growth may further impact these areas.

**Table 1**

**On-Site Noise Monitoring Results (dBA)  
Reynolds Ranch Subdivision  
South of Harney Lane (West of Hwy 99)**

| <b>Parameter</b>          | <b>Property Line</b>   |  |  |
|---------------------------|--|--|--|
|                           | <b>Meter placed<br/>between 2<sup>nd</sup> and 3<sup>rd</sup><br/>Houses, South of<br/>Harney Lane</b> | <b>Southwest Corner<br/>of Parcel, Near<br/>Train Tracks</b> | <b>Houses, Northeast<br/>Corner of Parcel<br/>(18 yards to Hwy<br/>99 Fence)</b> |
| 24-hour CNEL              | 68   | 76   | 74   |
| Maximum 1-Hour LEQ        | 69   | 72   | 72   |
| When (?)                  | 6:00 a.m. to<br>7:00 a.m.  | 11 p.m. to<br>midnight.*                                     | 7:00 a.m. to<br>8:00 a.m.  |
| 2nd-Highest 1-Hour<br>LEQ | 63   | 71   | 72   |
| When (?)                  | 5:00 p.m. to<br>6:00 p.m.*   | 5:00 a.m. to<br>6:00 a.m.                                    | 8:00 a.m. to<br>9:00 a.m.  |
| Minimum 1-Hour LEQ        | 52   | 45   | 63   |
| When (?)                  | 4:00 a.m. to<br>5:00 a.m.  | 9:00 a.m. to<br>10:00 a.m.                                   | 1:00 a.m. to<br>2:00 a.m.*   |
| 1-Second Maximum          | 93   | 96   | 93   |
| 1-Second Minimum          | 43   | 39   | 44   |

\* Measurement occurs at other hours as well

## **IMPACT SIGNIFICANCE CRITERIA**

Noise impacts are considered significant if:

1. They create violations of noise standards, or,
2. They substantially worsen an already excessive noise environment, or,
3. They substantially increase an existing quiet environment even if noise standards are not violated by the proposed action.

The term "substantial increase" is not defined by any responsible agency. The limits of perceptibility by ambient grade instrumentation (sound meters) or by humans in a laboratory environment is around 1.5 dB. Under ambient conditions, people generally do not perceive that noise has clearly changed until there is a 3 dB difference. A threshold of 3 dB is commonly used to define "substantial increase." An increase of +3 dBA CNEL in traffic noise would be consistent a significant impact.

Two characteristic noise sources are typically identified with land use intensification such as that proposed for the development of Reynolds Ranch. Construction activities, especially heavy equipment, will create short-term noise increases near the project site. Such impacts would be important for nearby noise-sensitive receptors. Upon completion, project-related traffic will cause an incremental increase in area-wide noise levels throughout the project area. Traffic noise impacts are generally analyzed both to insure that the project not adversely impact the acoustic environment of the surrounding community, as well as to insure that the project site is not exposed to an unacceptable level of noise resulting from the ambient noise environment acting on the project. This project will cause an increase in area wide traffic but the increase will likely be small relative to the overall traffic projections once area build-out is completed.

## **THRESHOLDS OF SIGNIFICANCE**

According to the current CEQA Appendix G guidelines, noise impacts are considered potentially significant if they cause:

- a. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies. Noise levels exceeding the City of Lodi General Plan Noise Standards or Municipal Code would be considered significant.
- b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels.
- c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

- d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

CEQA Guidelines also identify potential impact significance due to aircraft noise. CEQA states that for a project located within an airport land use plan or where such a plan has not been adopted, within two miles of an airport, a project could have a significant effect on the environment. The closest airport to the project site is the Lodi Airpark. This airport is 4-5 miles WSW of the site, and supports 20-30 operations per day. The airport's noise "footprint" does not extend beyond the immediate airport boundary. Aircraft noise is not further considered in this analysis.

Construction noise is not governed by ordinance limits on allowable times of equipment operations but time limits may be placed on grading or other construction permits. Construction activities would need authorization under City issuance of construction permits before any work could commence on-site. Construction activities should be limited to the hours of 7 a.m. to 10 p.m., Monday through Sunday, consistent with the City's Noise Ordinance (Section 9.24.030.c) if activities will occur within proximity (500 feet) of any noise sensitive land uses.

## **CONSTRUCTION NOISE IMPACTS**

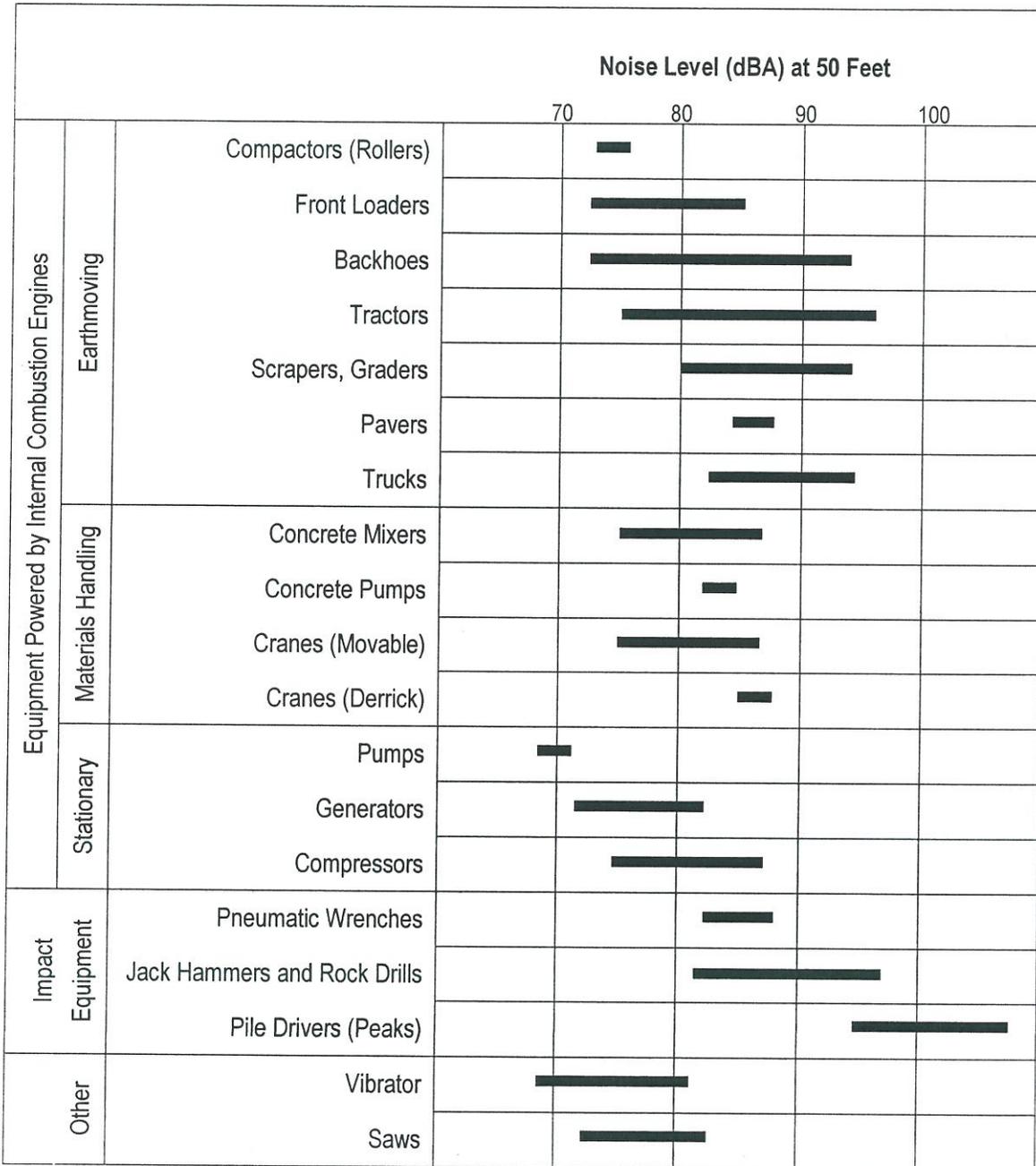
Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases dominated initially by earth-moving sources, then by foundation and parking area construction, and finally for finish construction.

Figure 2 shows the typical range of construction activity noise generation as a function of equipment used in various building phases. The earth-moving sources are seen to be the noisiest with equipment noise ranging up to about 90 dBA at 50 feet from the source. Several pieces of equipment operating in close proximity to each other may create a combined noise level of around 93 dB. Spherically radiating point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance, or about 20 dB in 500 feet of propagation. The loudest earth-moving noise sources will therefore sometimes be detectable above the local background beyond 1,000 feet from the construction area. An impact radius of 1,000 feet or more pre-supposes a clear line-of-sight and no other machinery or equipment noise that would mask project construction noise. With buildings and other barriers to interrupt line-of-sight conditions, the potential "noise envelope" around individual construction sites is reduced. Construction noise impacts are, therefore, somewhat less than that predicted under idealized input conditions.

Because of close proximity, construction noise impacts would most likely affect the exterior nearby residential uses to the north of the property, along Harney Lane. Additionally, because site development is phased, any existing tenants of an already completed phase could be subject to construction noise from subsequent phases. Discretionary scheduling of noisiest activities may be required to minimize such possible construction noise intrusion. Noise can also be mitigated by locating all stationary noise generating construction equipment as far as practical from existing residences. If impulsive noise generation such as pile driving or jack-hammers is necessary close to noise-sensitive users, activity scheduling to minimize off-site impacts, or

Figure 2

## Typical Construction Equipment Noise Generation Levels



Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

erection of temporary barriers, may be necessary. Construction activity noise impacts are considered less-than-significant with proper impact mitigation planning.

Section 9.24.030 (c) of the Municipal Code considers any noise generated between 10 p.m. and 7 a.m. that exceeds ambient levels by more than five (5) dB at any residential property to be “excessive, offensive or disturbing.” Construction activity noise near existing or future noise sensitive uses may exceed ambient levels by more than five (5) dB. A construction activity restriction time of 7 a.m. to 10 p.m. for allowable operation of any heavy equipment within 500 feet of any residence is recommended to mitigate this impact.

## **PROJECT-RELATED VEHICULAR NOISE IMPACTS**

Long-term noise concerns from the increase of residential, retail, and office uses at the project site center primarily on mobile source emissions on project area roadways. These concerns were addressed using the California specific vehicle noise curves (CALVENO) in the federal roadway noise model (the FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108). The model calculates the Leq noise level for a particular reference set of input conditions, and then makes a series of adjustments for site-specific traffic volumes, distances, roadway speeds, or noise barriers.

Table 2 summarizes the 24-hour CNEL level at 50 feet from the roadway centerline along eighteen (18) roadway segments for existing conditions and for future conditions, with and without the project. Specifically, five time frames were examined (existing, interim year 2008 with and without project, and build-out year 2030 with and without project). The data represent traffic only and do not include noise generated from train movements, addressed later in this document.

Existing traffic noise levels in the project vicinity are somewhat elevated; with almost half of the 18 roadway segments analyzed currently exceeding 65 dB CNEL at 50 feet from the centerline. The interim time frame (2008) will see little change from the existing noise environment, with or without the project. Only a portion of Phase I is scheduled for completion by 2008.

By 2030, at area-wide build-out, road noise will have increased substantially along many roadways. Traffic volume changes from infill development and from conversion of existing agricultural uses will substantially increase in the future and will modify the area’s acoustic environment. The noise-level difference between “with project” versus “no project” scenarios is, however, less-than-significant. At any off-site roadway the maximum project-related increase in 2008 will be +0.5 dB, and +2.9 dB CNEL in 2030. The 2.9 dB increase is directly adjacent to SR-99, and is not near any noise sensitive land uses. The maximum off-site project traffic noise impact near any residential uses is +1.4 dB along Harney Lane, directly north of the project site. Individual traffic noise impacts will be well below the adopted +3.0 dB CNEL significance threshold.

Cumulatively, a number of roadway segments will experience significant noise level increases compared to existing noise levels at the same locations. Comparison of existing conditions to conditions in 2030 without the project show some segments experiencing an increase of up to +2.8 dB from cumulative growth without the project. About 60 percent of the segments

Table 2

**Reynolds Ranch  
Traffic Noise Impact Analysis  
(dBA CNEL at 50 feet from centerline)**

|                             | Existing | 2008 | 2008/ w<br>Project | 2030 | 2030/w<br>Project |
|-----------------------------|----------|------|--------------------|------|-------------------|
| <b>North-South Segments</b> |          |      |                    |      |                   |
| <b>Hutchins St/</b>         |          |      |                    |      |                   |
| N of Harney                 | 68.4     | 68.5 | 68.7               | 69.5 | 70.0              |
| Harney-Armstrong            | 70.3     | 70.4 | 70.4               | 72.4 | 72.5              |
| <b>West Ln/</b>             |          |      |                    |      |                   |
| S of Harney                 | 69.5     | 69.5 | 69.6               | 72.1 | 72.3              |
| <b>Stockton St/</b>         |          |      |                    |      |                   |
| N of Harney                 | 65.9     | 66.0 | 66.0               | 66.9 | 67.8              |
| S of Harney                 | 46.9     | 46.9 | 49.3               | 47.4 | 60.6              |
| <b>Cherokee Ln/</b>         |          |      |                    |      |                   |
| N of Harney                 | 65.8     | 66.3 | 66.4               | 66.5 | 65.9              |
| <b>W Frontage Rd/</b>       |          |      |                    |      |                   |
| Harney-SR-99 SB Ramp        | 58.3     | 58.3 | 56.6               | 59.0 | 61.9              |
| SR-99 SB Ramp-Armstrong     | 62.6     | 62.6 | 62.9               | 64.9 | 65.8              |
| S of Armstrong              | 57.8     | 57.8 | 57.8               | 60.1 | 60.1              |
| <b>East-West Segments</b>   |          |      |                    |      |                   |
| <b>Harney Ln/</b>           |          |      |                    |      |                   |
| Ham-Hutchins                | 67.3     | 68.5 | 68.7               | 70.1 | 71.0              |
| Hutchins-Stockton           | 68.7     | 69.4 | 69.7               | 70.7 | 71.9              |
| Stockton-W Frontage Rd      | 67.9     | 68.8 | 69.3               | 70.2 | 71.6              |
| W Frontage-E Frontage       | 67.1     | 67.8 | 68.3               | 69.1 | 70.2              |
| E of E Frontage Rd          | 65.2     | 65.8 | 65.9               | 67.2 | 67.6              |
| <b>Armstrong Rd/</b>        |          |      |                    |      |                   |
| W of Hutchins               | 64.1     | 64.1 | 64.1               | 66.4 | 66.5              |
| Hutchins-W Frontage Rd      | 62.2     | 62.2 | 62.3               | 64.5 | 65.0              |
| W Frontage-E Frontage       | 60.7     | 60.7 | 60.9               | 63.0 | 63.6              |
| E of E Frontage Rd          | 55.9     | 55.9 | 55.9               | 58.2 | 58.7              |

Source: Reynolds Ranch Traffic Study, April 2006

analyzed will exceed the 65 dB CNEL threshold, even without implementation of the proposed project.

The proposed project will, however, cause cumulative noise levels at off-site locations to increase by more than +3.0 dB CNEL when project traffic and cumulative growth are combined. Cumulatively significant traffic noise level increases will occur in 2030 along the following roadway segments:

| Roadway Segment           | Increase from Existing (dB) |           |
|---------------------------|-----------------------------|-----------|
|                           | w/o Project                 | w/Project |
| <b>W. Frontage Road*</b>  |                             |           |
| Harney Lane-SR 99 SB Ramp | +0.7                        | +3.6      |
| <b>Harney Lane</b>        |                             |           |
| Ham-Hutchins              | +2.8                        | +3.7      |
| Hutchins-Stockton         | +2.0                        | +3.2      |
| Stockton-Frontage         | +2.3                        | +3.2      |

\* dominated by freeway noise, not considered significant

Project traffic noise impacts are considered cumulatively significant. The impact is mitigated by the required inclusion of perimeter walls on new residential development that abuts Harney Lane.

On-site traffic noise exposure for any proposed residential use will result primarily from Harney Lane or from internal collector roads. One segment, Stockton Street south of Harney Lane, will experience a very large increase of +13.2 dB. However, this link will be an entrance to the new Reynolds Ranch development. Even with this substantial increase, on-site traffic noise at 50 feet from the Stockton Street centerline of 60.6 dB CNEL will be well below the City’s 65 dB CNEL exterior standard. This will not create any constraint for siting noise-sensitive land uses.

On-site noise levels at proposed residential uses south of Harney Lane may be exposed to noise levels exceeding City of Lodi standards at the first tier of development closest to the roadway. Under acoustically “soft” conditions (landscaping and irregular surfaces), the 65 dB CNEL contour will extend 145 feet south of the centerline. Exterior recreational uses within 145 feet would require shielding from traffic noise. Perimeter noise walls of 6-7 feet in height would reduce rear yard noise levels to within City Standards.

If exterior levels exceeded 65 dB CNEL, enhanced structural protection is needed to allow the 45 dB CNEL interior standard to be met. The 65 dB CNEL contour at any upstairs building façade would be characterized by acoustically “hard” propagation conditions. The upstairs 65 dB CNEL contour distance will extend up to 245 feet from the Harney Lane centerline. Any two-story residential uses within 245 feet will require dual-paned windows and supplemental ventilation/air conditioning. In order to meet City of Lodi noise standards the following measures are thus required along the northern site perimeter:

1. Outdoor recreational space within 145 feet of the Harney Lane centerline must be shielded by solid perimeter walls of 6-7 feet in height, and,

2. Habitable second-story residential space within 245 feet of the Harney Lane centerline must have upgraded structural protection to include dual-paned windows and supplemental ventilation to allow for window closure.

## ON-SITE NOISE GENERATION

In areas where commercial and residential uses share a common property line, it is often not the overall magnitude of the noise that leads to conflict. It is more typically some unique aspect of the noise (music, amplified voice, whine or hum, etc.), or, most commonly, the time of day of the noise event that causes conflicts. Early morning deliveries, back-up alarms, rumbling and idling diesel trucks, late night fast-food outlet loudspeakers, young persons assembling in shopping center parking lots with loud car music late in the evening, or very early trash pick-up or parking lot sweeping, are sources that can engender noise conflicts in a mixed use environment. Since planned on-site commercial activities will be located near residences, nocturnal on-site activities could be audible late at night when background noise levels are lowest

Such impacts would possibly derive from unloading activities at the rear of the major stores from site maintenance such as sweeping or trash pick-up, from mechanical equipment on building roofs, and from on-site traffic patterns. The menu board loudspeakers at fast food restaurants could also impact noise.

Phase I anticipates construction of office space in the southeastern corner of the site, west of SR-99 and the Frontage Road. The nearest sensitive receptor to the office use will be the high-density residential development to the west. Commercial uses will be sited to the north, SR-99 is to the east and agricultural uses exist south of the site. The only potential nuisances for the nearby future residences from office building operations would be trash pick up and HVAC equipment. Because trash pick up would only be a daytime event this would not cause a siting constraint. The distance from the western building wall to the boundary of the high-density residential parcel is 260 feet.

Mechanical equipment noise was presumed to be typical of comparable HVAC sources. Commercial air conditioners ("package units") are typically rated at around 55 dB at 50 feet from the equipment. Distance separation to the nearest homes at 260 feet will reduce HVAC noise to well below the ambient "hum" from SR-99 traffic.

The office building will work two shifts. The arrival of the early shift and the departure of the late shift may occur during noise-sensitive hours. However, more of the parking will be on the eastern side of the building with the building itself creating a noise barrier. Highway 99 traffic also creates an elevated baseline that will mask any employee arrival/departure. The semi-trucks traveling at 70 mph on SR-99 are tens of times louder than slow-speed passenger cars within the office parking lot. Any mitigation measures used within the proposed high density residential west of the office building (dual-pane windows, extra insulation, etc.) to block out freeway noise will also shield the parking lot activity from any shift changes.

Phase II involves construction of a commercial/retail parcel at the northeast corner of the property. This parcel is bounded by SR-99 to the west, off-site residential uses to the north, across Harney Lane, and medium-density, high-density and senior high-density developments on the west and southwest, across "A" Street.

The medium-density housing just south of Harney Lane will have the least setback from any of the retail buildings, about 125 feet. The high-density senior housing will have approximately 180 to 200 feet of separation from the closest shops and the high-density residential bounding the office parcel will have about 140 feet of separation from the nearest commercial/retail space.

As noted above, all residential parcels experience sufficient distance separation from the buildings to prevent HVAC equipment from being a nuisance. Only the major stores would have loading docks, and none are sited near the on-site residential parcels. The only potential issue could be if fast food restaurants or drive thru-facilities are planned on the "A" Street perimeter. Sound boards where ordering takes place can be a nuisance especially at night. Many fast food restaurants keep late hours or are open 24-hours. If the sound boards cannot be oriented away from nearby residences then sound walls may have to be erected around the order boards. Additionally, time restrictions may be necessary. These details must be dealt with during the design stage.

On all office and commercial sites, maintenance activities such as refuse collection or parking lot sweeping, or stacking or retrieval of temporary outdoor storage could be a noise source. Possible mitigation would include time restrictions on these activities or sound walls. These details also must be dealt with during the design stage.

Any current or future residential uses opposite Harney Drive are anticipated to be approximately 300 feet from the nearest major retail use. Measured noise levels at this site are currently in excess of 65 dB CNEL due to Freeway proximity. This background noise, in addition to the setback distance, will serve to mask any potential noise associated with truck delivery and unloading at the planned major retailers for off-site residential uses.

## **TRAIN NOISE**

Train noise is not well characterized by the CNEL descriptor. The train noise pattern will be approximately 59 minutes of very quiet conditions with one minute of loud rumble. However, federal noise compatibility standards are based upon 1- or 24-hour exposures. A measurement of train noise was conducted using data collected by sound meters placed on site March 9-10, 2006. The meter positioned on the southwest corner of the parcel, near the train tracks determined a CNEL of 75.8 dB. According to Wayne Horiuchi of the Union Pacific Railway Company, in a letter dated March 13, 2006, it is difficult to predict future usage as demand for services are driven by shippers needs for goods.

In order to gauge a worst case scenario for train noise, for the purposes of the study, a doubling of train movements was assumed for the future. Because of the logarithmic nature of noise, a 100% increase in train movement would translate into a +3 dB growth, raising the daily CNEL to

79 dB (76 dB + 3). To mitigate noise to 65 dB at the nearest sensitive receptor with no sound wall, a setback distance of 430 feet from the tracks would be required. Other noise mitigation options include construction of a sound wall.

Currently all planned residential uses adjacent to the train tracks will be separated by a proposed mini-storage facility. If the mini-storage facility is constructed as a continuous structure, it will replace the need for a sound wall. If there are continuity breaks, a sound wall will be required in those areas. As currently laid out, residential uses adjacent to the train tracks will benefit from approximately 300 feet of distance separation.

If a sound wall is the preferred option, at the nearest homes for outdoor recreational uses, at 300 feet from the track, a 6 foot sound wall would provide the necessary attenuation. The sound wall would provide the needed mitigation for usable outdoor space and the first story of a residence. If the home were two stories, then upgraded acoustical windows and ventilation would be required to achieve an interior sound level of 45 dB CNEL. In residential construction, the structural noise level reduction (in dB) is almost equal to the rated sound transmission class (STC) of any openable windows. Sound-rated windows with an STC of 31 or 32 will likely be required for the second stories of western perimeter units.

Mitigation requirements for a 430 foot residential set-back (requiring no perimeter walls), versus a 300 foot setback (requiring walls or shielding by the mini-storage), for the closest noise-sensitive uses are as follows:

### Train Mitigation Noise Summary

|  | Option 1    | Option 2    |
|--|-------------|-------------|
| Setback Distance from Tracks                       | 430 feet    | 300 feet    |
| Noise Loading in Useable Outdoor Space (soft site) | 65 dB CNEL  | 67 dB CNEL  |
| Wall Required?                                     | No          | 6 feet high |
| Noise Loading at Second Story (hard site)          | 70 dB CNEL* | 71 dB CNEL* |

\* Upgraded acoustical features required to achieve a 45 dB CNEL. West facing perimeter homes shall be equipped with sound rated windows of STC= 31 or 32 and a supplemental fresh air duct capable of delivering 75 CFM of outside air to the west-facing facades.

A supplemental acoustical analysis should be submitted in conjunction with the issuance of building permits to verify that adequate structural noise protection exists in perimeter residences closest to the train tracks to meet the 45 dBA CNEL interior standard. Supplemental ventilation (most likely air conditioning) is required in any livable space where window closure to shut out train noise is needed to meet interior standards. Disclosure of the presence of the tracks should

be included in all real estate transfer documents to anyone buying or leasing a property within 500 feet of the train tracks. The notification should state that although the train noise levels do not exceed City of Lodi Noise Standards, train noise may still be clearly audible, particularly train horns near at-grade crossings.

Train passage may also create perceptible vibrations. According to the US Department of Transportation Transit Noise and Vibration Impact Assessment, the screening distance for train vibration for a heavy railway is 200 feet. All planned residential development is well outside this distance and therefore will not be subject to vibration perception.

## **DETENTION BASIN PUMP NOISE**

A Detention Basin is planned in the southwest corner of the property. It is not known if the basin will be totally passive, or if a pumping system will be required to drain the basin after winter rain storms. If a pump will be used, the location and size of the associated pump has not yet been determined. If the pump is located on the north, or east side of the basin it could be as close as 70 feet to future residential development. Depending on the size of the pump, noise levels could range from 68-80 dBA at a distance of 50 feet from the source. Therefore, even at the lower end of this range the noise from a pump located in a worst-case location along the east or north of the basin would be audible at the nearest future dwellings. Pump noise at a distance of 70 feet will be 65-77 dBA. For this analysis it is assumed that a 55 dBA nighttime noise threshold for residential uses was appropriate. Even with a quiet pump, the 55 dB standard would be exceeded to 225 feet from the unit under line-of-sight conditions. With several pumps in simultaneous operation, the noise “envelope” could be greater.

An open-top walled enclosure of the pump array would reduce off-site noise levels, but likely not for second story residences. Noise level reductions of 5-10 dB from walled enclosures would still create an audible “hum” during pumping operations. Therefore, if the pumps are located near any to the residential dwellings the pump station would need to be enclosed. This would provide approximately 30-35 dBA of noise attenuation and render pumping activities inaudible.

## **AGRICULTURAL NOISE**

Early morning or nighttime farm operations may also create a perceptible noise intrusion at proposed residential uses. Irrigation pumps, crop duster airplanes, or harvesting equipment can be noisy in residential bedrooms when operating during typical “quiet times”. An orchard buffer will be created along the southern site perimeter, the mini-storage will shield activities in the west, and the Harney Lane project frontage will have sound walls to the north. Site development will gradually isolate the site from agricultural activity noises. It is recommended that all real estate transfer documents notify the buyer that noise, dust, and odor or other nuisance may be experienced as residential use encroaches into agricultural areas. However, the agricultural activities will gradually be pushed further away from such uses as the site develops. The expanding set-back distance will ultimately minimize any nuisance perception from agriculture.

## MITIGATION

Construction activities from project development may impact existing surrounding residential uses and will at times. Such impacts are somewhat mitigated by required compliance with grading/construction permits. These considerations include:

1. All construction and general maintenance activities within 500 feet of an occupied residence, except in an emergency, shall be limited to the hours of 7:00 a.m. to 10:00 p.m. Monday thru Saturday.
2. Staging areas shall be located away from existing residences.
3. All construction equipment shall use properly operating mufflers.

Traffic noise impact analyzed at a “project” versus “no project” condition in the interim year and at build-out in 2030 shows project-related noise is not individually significant.

Traffic noise is cumulatively significant from this project and from forecasted growth, when comparing build-out in 2030 with existing conditions. Cumulatively significant traffic noise impacts are forecasted to occur along Harney Lane from west of the project site to SR-99. Cumulative impacts will be mitigated by the installation of adequate sound walls for new residential development both north and south of Harney Lane.

Proposed residential uses south of Harney Lane may be exposed to traffic noise in excess of 71 dB CNEL. The following mitigation is required to meet the City of Lodi Noise Compatibility Standards:

1. Outdoor recreational space within 145 feet of the Harney Lane centerline must be shielded by solid perimeter walls of 6-7 feet in height, and,
2. Habitable second-story residential space within 245 feet of the Harney Lane centerline must have upgraded structural protection to include dual-paned windows and supplemental ventilation to allow for window closure.

Project-related commercial on-site noise may impact proposed on-site residential uses. This noise includes, but is not limited to fast food restaurant loudspeakers, early morning deliveries to the rear of stores, early morning trash pickup for commercial uses. These potential impacts must be evaluated and mitigated during the design stage.

Current and future homes across Harney Lane will be shielded from noise associated with major retail uses by the already elevated ambient background freeway noise and by setback distances of approximately 300 feet.

Homes situated adjacent to the train tracks require either a setback distance of 430 feet or an 6 foot sound wall to mitigate train noise to 65 dB at the residential exterior and ground floor

interior. This attenuation may be achieved by the design of the mini-storage project. An interior noise analysis should be submitted in conjunction with building plan check to verify that structural noise reduction will be achieved in a livable upstairs space at the perimeter tier of homes by the specified structural components (windows, walls, doors, roof/ceiling assembly) shown on building plans. Disclosure of the presence of the tracks should be included in all real estate transfer documents to anyone buying or leasing a property within 500 feet of the train tracks.

Residential development is currently planned at 300 feet or more from the centerline of the train tracks. At this distance no train related vibration should be perceptible.

A detention basin pump system may be required to empty the detention basin. The planned proximity of homes to the basin would likely require substantial shielding if such pumps were to operate at night. Any pump station should be enclosed in order to not create a nocturnal noise nuisance at the nearest residences.

Noisiest agricultural activities will have substantial set-back from on-site residences particularly as the site continues to develop. Buyer notification of the presence of possible agricultural activity noise should be made as part of any property transfer documents.