3.4 NOISE

The purpose of this Section is to evaluate project-related noise source impacts to on-site and surrounding land uses. This section evaluates short-term construction related impacts as well as long-term buildout conditions. Information in this section is based on City of Lodi General Plan and Development Code standards. Additionally, information was compiled from the City of Lodi Noise Ordinance, Chapter 9.24, *Noise Regulation*. For the purposes of mobile source noise modeling and contour distribution, traffic information contained in the project Traffic Study was utilized (refer to Section 3.2, *Traffic and Circulation*, and Appendix C, *Traffic Study*). Refer to Appendix 15.4, *Noise Data*, for the assumptions used in this analysis. Where necessary, mitigation measures are recommended to minimize noise impacts of the project.

3.4.1 EXISTING CONDITIONS

Noise Scales and Definitions

Sound is technically described in terms of the loudness (amplitude) of the sound and frequency (pitch) of the sound. The standard unit of measurement of the loudness of sound is the Decibel (dB). Since the human ear is not equally sensitive to sound at all frequencies, a special frequency-dependent rating scale has been revised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) compensates for this by discriminating against frequencies in a manner approximating the sensitivity of the human ear.

Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes. In terms of human response to noise, the difference of 10 dBA is judged to be twice as loud and with 20 dBA being four times as loud and so forth. Everyday sounds normally range from 30 dBA (very quiet) to 100 dBA (very loud). Examples, of various sound levels in different environments are shown in Table 3.4-1, *Sound Levels and Human Response*.

Many methods have been developed for evaluating community noise to account for, among other things:

- The variation of noise levels over time;
- The influence of periodic individual loud events; and
- The community response to changes in the community noise environment.

Numerous methods have been developed to measure sound over a period of time. These methods include: 1) the Community Noise Equivalent Level (CNEL); 2) the Equivalent Sound Level (Leq); and 3) Day/Night Average Sound Level (Ldn). These methods are described below.

Community Noise Equivalent Level (CNEL)

The predominant community noise rating scale used in California for land use compatibility assessment is the Community Noise Equivalent Level (CNEL). The CNEL reading represents the average of 24 hourly readings of equivalent levels, known as Leq's, based on an A-weighted decibel with upward adjustments added to account for increased noise sensitivity in the evening and night periods. These adjustments are +5 dBA for the evening, 7:00 p.m. to 10:00 p.m., and +10 dBA for nighttime, between the hours of 10:00 p.m. to 7:00 a.m. CNEL may be indicated by "dBA CNEL" or just "CNEL".

TABLE 3.4 –1
SOUND LEVELS AND HUMAN RESPONSE

Noise Source	Noise Level (dB(A))	Response
	150	
Carrier Jet Operation	140	Harmfully Loud
	130	Pain Threshold
Jet Takeoff (200 feet; thence.) Discotheque	120	
Unmuffled Motorcycle Auto Horn (3 feet; thence.) Rock'n Roll Band Riveting Machine	110	Maximum Vocal Effort Physical Discomfort
Loud Power Mower Jet Takeoff (2000 feet; thence.) Garbage Truck	100	Very Annoying Hearing Damage (Steady 8-Hour Exposure)
Heavy Truck (50 feet; thence.) Pneumatic Drill (50 feet; thence.)	90	
Alarm Clock Freight Train (50 feet; thence.) Vacuum Cleaner (10 feet; thence.)	80	Annoying
Freeway Traffic (50 feet; thence.)	70	Telephone Use Difficult
Dishwashers Air Conditioning Unit (20 feet; thence.)	60	Intrusive
Light Auto Traffic (100 feet; thence.)	50	Quiet
Living Room Bedroom	40	
Library Soft Whisper (15 feet; thence.)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

Source: Melville C. Branch and R. Dale Beland, *Outdoor Noise in the Metropolitan Environment*, 1970, page 2.

Leq

The Leq is the sound level containing the same total energy over a given sample time period. The Leq can be thought of as the steady sound level, which, in a stated period of time, would contain the same acoustic energy as the time-varying sound level during the same period. Leq is typically computed over 1, 8 and 24-hour sample periods.

Day Night Average (LDN)

Another commonly used method is the day/night average level or Ldn. The Ldn is a measure of the 24-hour average noise level at a given location. It was adopted by the U.S. Environmental Protection Agency (EPA) for developing criteria for the evaluation of community noise exposure. It is based on a measure of the average noise level over a given time period called the Leq. The Ldn is calculated by averaging the Leq's for each hour of the day at a given location after penalizing the "sleeping hours" (defined as 10:00 p.m. to 7:00 a.m.), by 10 dBA to account for the increased sensitivity of people to noises that occur at night. The maximum noise level recorded during a noise event is typically expressed as Lmax. The sound level exceeded over a specified time frame can be expressed as Ln (i.e., L_{90}, L_{50}, L_{10}, etc.). L_{50} equals the level exceeded 50 percent of the time, L_{10} equals the level exceeded ten percent of the time, etc.

As previously mentioned, people tend to respond to changes in sound pressure in a logarithmic manner. In general, a 3 dBA change in sound pressure level is considered a "just detectable" difference in most situations. A 5 dBA change is readily noticeable and a 10 dBA change is considered a doubling (or halving) of the subjective loudness. It should be noted that a 3 dBA increase or decrease in the average traffic noise level is realized by a doubling or halving of the traffic volume, or by about a 7 mile per hour (mph) increase or decrease in speed.

For each doubling of distance from a point noise source, the sound level will decrease by 6 dBA. In other words, if a person is 100 feet from a machine, and moves to 200 feet from that source, sound levels will drop approximately 6 dBA. For each doubling of distance from a line source, like a roadway, noise levels are reduced by 3 to 5 decibels, depending on the ground cover between the source and the receiver.

Noise Attenuation

Noise barriers provide approximately a 5 dBA noise reduction (additional reduction may be provided with a barrier of appropriate height, material, location and length). A row of buildings provides up to 5 dBA noise reduction with a 1.5 dBA reduction for each additional row up to a maximum reduction of approximately 10 dBA. The exact degree of noise attenuation depends on the nature and orientation of the structure and intervening barriers.

Noise Standards

It is difficult to specify noise levels which are generally acceptable to everyone. What is annoying to one person may be unnoticed by another. Standards may be based on documented complaint activity in response to documented noise levels, or based on studies on the ability of people to sleep, talk, or work under various noise conditions. All such studies, however, recognize that individual responses vary considerably. Standards usually address the needs of most of the general population.

State Noise Standards

The State of California Office of Noise Control has established guidelines for acceptable community noise levels which are based on the CNEL rating scale. The guidelines rank noise land use compatibility in terms of "normally acceptable", "conditionally acceptable", and "clearly unacceptable" noise levels for various land use types. As shown in Table 3.4-2, *California Land Use Compatibility Noise Guidelines*, a project in the "normally acceptable" category would be acceptable in terms of both its indoor/outdoor noise exposure without special noise abatement measures. Where outdoor noise exposure is less important, projects can be designed to provide acceptable interior environments in the "conditionally acceptable" category. This may involve providing air conditioning so that windows can remain closed or at higher levels, sound rated windows and walls. Acoustical reports are recommended to be required where the noise exposure is "conditionally acceptable" or "normally unacceptable."

As shown in Table 3.4-2, the State Office of Noise Control, in its Land Use Compatibility Standards, defines an outdoor level of 60 dBA CNEL or less as being "normally acceptable" for residential uses. A 60 dBA CNEL is generally considered to be an appropriate exterior level near roadways where outdoor use is a major consideration, such as in backyards, recreation areas in residential projects and many park areas. A second intent of the 60 dBA CNEL standard is to provide, either through design, location, or insulation, for interior noise levels no greater than 45 dBA CNEL, which is generally accepted as the maximum acceptable noise level for most indoor residential activities.

State Noise Insulation Standards are consistent with the Office of Noise Control Residential Land Use Compatibility standards. In 1974, the State adopted Noise Insulation Standards (Title 25, State Administrative Code) for new hotels, motels, and dwellings other than single-family detached dwellings. Those standards established 45 dBA CNEL as the maximum interior sound level (attributable to exterior sources) in any room. Where exterior sound levels are 60 dBA CNEL or above, acoustical analyses for projects are required to ensure that the structure has been designed to limit outside noise to the allowable interior levels. The State Noise Insulation Standards also include standards to be met for sound transmission between units.

Local agencies may regulate noise levels of most sources not regulated by the Federal government, may provide standards for insulation of noise receivers either within the structure or by placement of noise barriers such as walls and through land use decisions, may reduce noise impacts by separating noise generators from noise sensitive uses.

City of Lodi Noise Standards

The City of Lodi includes a Noise Element within its General Plan. The goals and policies within the Noise Element are used as a general planning guideline. The City also has a Noise Ordinance, which is more legally enforceable than the Noise Element. Table 3.4-3, *City of Lodi Land Use Compatibility Chart* indicates the noise level acceptability of land uses that are applicable to the project.

TABLE 3.4-2
CALIFORNIA LAND USE COMPATIBILITY NOISE GUIDELINES

Land Use Category	Community Noise Exposure			
	Ldn or CNEL, dBA			
	Normally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential - Low Density, Single-Family, Duplex, Mobile Homes	50 - 60	55 - 70	70-75	75-85
Residential - Multiple Family	50 - 65	60 - 70	70 - 75	70 - 85
Transient Lodging - Motel, Hotels	50 - 65	60 - 70	70 - 80	80 - 85
Schools, Libraries, Churches, Hospitals, Nursing Homes	50 - 70	60 - 70	70 - 80	80 - 85
Auditoriums, Concert Halls, Amphitheaters	NA	50 - 70	NA	65 - 85
Sports Arenas, Outdoor Spectator Sports	NA	50 - 75	NA	70 - 85
Playgrounds, Neighborhood Parks	50 - 70	NA	67.5 - 75	72.5 - 85
Golf Courses, Riding Stables, Water Recreation, Cemeteries	50 - 70	NA	70 - 80	80 - 85
Office Buildings, Business Commercial and Professional	50 - 70	67.5 - 77.5	75 - 85	NA
Industrial, Manufacturing, Utilities, Agriculture	50 - 75	70 - 80	75 - 85	NA

Source: Office of Noise Control, California Department of Health.

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, but with closed windows and fresh air supply systems or air conditioning will normally suffice.

Normally Unacceptable: New Construction or development should 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.

NA: Not Applicable

TABLE 3.4-3
CITY OF LODI LAND USE COMPATIBILITY CHART

Land Use Category	Exterior Noise Exposure LDN or CNEL, DBA					
	55	60	65	70	75	80
Residential, Including Apartments and Mobile Homes						
Business Offices, Medical and Dental Offices, Retail and Wholesale Facilities.						

	Presumed to be Acceptable: No Special noise mitigation required.
	Conditionally Acceptable: Acceptability depends on specific property uses and the extent of noise mitigation provided.
	Normally Acceptable: Acceptability requires specific findings outlined in Policy A-8 of the Noise Element Text of the City of Lodi General Plan.
	Presumed to be Unacceptable: Adequate mitigation measures unlikely to be available

Source**:** Applicable land use categories from Figure 6-4 of the City of Lodi General Plan.

Chapter 9.24, *Noise Regulation*, of the City of Lodi Municipal Code is City's Noise Ordinance. Municipal Code Section 9.24.020 *Public Nuisance Noise* does not quantify acceptable decibel levels per use, but relies upon a system of comparing the existing ambient noise level(s) (as determined by noise field measurements) to the noise emitting land use. Based on a discussion with City Planning Department personnel,[1] a noise emitting land use may not emit more than 5 decibels over ambient condition or it is considered not in compliance with the City's Noise Ordinance. Variables that are also considered with respect to noise compliance in the City's Noise Ordinance are:

- The volume of the noise;
- The intensity of the noise;
- Whether the nature of the noise is usual or unusual for the area and hour;
- Whether the origin of the noise is natural or unnatural;
- The volume and intensity of the background noise, if any;

[1] Based on a telephone conversation between Mr. William Rice, Environmental Analyst of RBF Consulting and Mr. Mark Miesner, Associate Planner of the City of Lodi on January 2, 2003 at 2:30 PM.

- The proximity of the noise to residential sleeping facilities;
- The nature and the zoning of the area within which the noise emanates;
- The density of the inhabitation of the area within which the noise emanates;
- The time of day or night the noise occurs;
- The duration of the noise;
- Whether the noise is produced by a commercial or noncommercial activity.

The provisions found within this Noise Ordinance are inapplicable to emergency work as defined in the City of Lodi Ordinance 1449 § 1 (part), 1989.

Location of Sensitive Receptors

Certain land uses are particularly sensitive to noise, including schools, hospitals, rest homes, long-term medical and mental care facilities and parks and recreation areas. Residential areas are also considered noise sensitive, especially during the nighttime hours.

The proposed project site is located within the City of Lodi, at the Kettleman Lane and Lower Sacramento Road intersection. To the south and west of the project site are undeveloped properties that are designated as commercial and agriculture. The Safeway Plaza and Sunset Plaza are commercial uses to the east and southeast. The Sunwest residential development is northeast of the project site and consists of single-family homes. To the north along Taylor Road and North Hilde Lane are approximately 30 single-family residences. Additionally, directly north of the project site and south of Taylor Road is the recently approved G-REM Residential Project, which would allow for the development of up to 33 residential units[2].

Existing Noise Environments

Field Measurements

RBF Consulting conducted noise measurements in December 2002 as a means to quantify existing ambient noise levels in the project area. The noise measurement sites were representative of typical existing noise exposure within and immediately adjacent to the project site.

Noise monitoring equipment used for the ambient noise survey consisted of a Larson Davis Laboratories Model LDL 820 sound level analyzer equipped with a Bruel & Kjaer (B&K) Type 4176 ½" microphone. The instrumentation was calibrated prior to use with a B&K Type 4230 acoustical calibrator to ensure the accuracy of the measurements and to ensure compliance with applicable requirements of the American National Standards Institute (ANSI) for Type I (precision) sound level meters. The results of the field measurements are indicated in Table 3.4-4, *Noise Measurements.* The highest noise level measurement (70.0 dBA) was taken at Site 5 located at the southwest corner of the property along Kettleman Lane.

[2] The City Council later rescinded the growth management allocation given to this project and the applicant subsequently withdrew the application. Currently there are no pending applications for development of this 5.6-acre property. (J.D. Hightower, pers.comm.. Feb.'03).

TABLE 3.4-4
NOISE MEASUREMENTS
(BASED ON FIELD MEASUREMENTS)

Site No.	Location	Leq (dBA)	Time	Comments
1	Sunset Marketplace/Lower Sacramento Road	65.8	7:00 a.m. – 7:15 a.m.	Foggy, low wind
2	Taylor Road/Lower Sacramento Road	64.0	7:20 a.m. – 7:35 a.m.	Foggy, low wind
3	Kettleman Lane/Lower Sacramento Rd.	65.8	7:40 a.m. – 7:55 a.m.	Foggy, low wind
4	Mills/Kettleman Lane	69.0	8:00 a.m. – 8:15 a.m.	Foggy, low wind
5	Kettleman Lane - southwest corner of property	70.0	8:20 a.m. – 8:35 a.m.	Foggy, low wind
6	Lower Sacramento Road – south of E. Olive	69.1	8:40 a.m. – 8:55 a.m.	Foggy, low wind
7	Lower Sacramento Road/Vine	67.8	4:00 p.m. – 4:15 p.m.	Foggy, slight wind
8	St. Moritz/Interlake	41.6	4:20 p.m. – 4:35 p.m.	Foggy, slight wind
9	Hilde Lane/Taylor Road	44.5	4:40 p.m. – 4:55 p.m.	Foggy, slight wind
10	North end of Hilde Lane	41.5	5:00 p.m. – 5:15 p.m.	Foggy, slight wind
11	Midpoint of Taylor Road	37.8	5:20 p.m. – 5:35 p.m.	Foggy, slight wind
12	West end of Taylor Road	43.7	5:40 p.m. – 5:55 p.m.	Foggy, slight wind

Source: Noise Monitoring Survey conducted by RBF Consulting, December 2002.

Computer Modeling

The existing and future roadway noise levels within the vicinity of the proposed project were projected using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters. These parameters determine the projected impact of vehicular traffic noise and include the roadway cross-section (e.g., number of lanes), the roadway width, the average daily traffic (ADT), vehicle travel speed, percentages of auto and truck traffic, the roadway grade, angle-of-view, site conditions ("hard" or "soft") and the percent of total ADT which flows each hour throughout a 24-hour period. The model does not account for ambient noise levels (i.e., noise from adjacent land uses) or topographical differences between the roadway and adjacent land uses. Noise projections are based on modeled vehicular traffic as derived from the project Traffic Study.

A 40 to 55 mile per hour (mph) average vehicle speed was assumed for existing conditions (varies depending on roadway) based on empirical observations and posted maximum speeds along the adjacent roadways. ADT estimates were obtained from the Project Traffic Study (refer to Appendix C, Traffic Study).

Existing Traffic Noise Levels

Table 3.4-5, *Existing Traffic Noise Contour Levels*, indicates the location of the 60, 65 and 70 CNEL noise contours associated with vehicular traffic along local roadways as modeled with the aforementioned FHWA computer model. Vehicular noise along two major roadways were modeled to estimate existing noise levels from mobile traffic. These roadways include West Kettleman Lane and Lower Sacramento Road.

TABLE 3.4-5
EXISTING TRAFFIC NOISE CONTOUR LEVELS

Roadway Segment	ADT	DBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline (in feet)		
			60 Ldn Noise contour	65 Ldn Noise Contour	70 Ldn Noise Contour
West Kettleman Lane:					
West of Lower Sacramento	9,800	61.6	136	63	29
East of Lower Sacramento	24,500	65.1	250	116	54
Lower Sacramento Road:					
Taylor Road to Kettleman Lane	10,800	62.1	145	67	31
South of Kettleman Lane	18,100	63.8	204	95	44

Note: Modeled results calculated using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters.

3.4.2 ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

In accordance with CEQA, the effects of a project are evaluated to determine if they will result in a significant impact on the environment. An EIR is required to focus on these effects and offer mitigation measures to avoid or substantially lessen any significant impacts, which are identified. The criteria, or standards, used to determine the significance of impacts may vary depending on the nature of the project. Noise impacts resulting from the implementation of the proposed project could be considered significant if they cause any of the following to occur:

Thresholds of Significance

- 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
- Exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels

- A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels
- For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels

Based on these standards, the effects of the proposed project have been categorized as either a "less than significant impact" or a "potentially significant impact." Mitigation measures are recommended for potentially significant impacts. If a potentially significant impact cannot be reduced to a less than significant level through the application of mitigation, it is categorized as a significant and unavoidable impact. The standards used to evaluate the significance of impacts are often qualitative rather than quantitative because appropriate quantitative standards are either not available for many types of impacts or are not applicable for some types of projects.

Significance of Changes in Ambient Noise Levels

A project is considered to have a significant noise impact where it exceeds an adopted noise standard for the project site or adjacent sensitive receptors. In addition to being concerned about the absolute noise level that might occur when a new source is introduced into an area, it is also important to consider the existing noise environment. If the existing noise environment is quiet and the new noise source greatly increases the noise exposure, then even though a criterion level might not be exceeded an impact may occur. Lacking adopted standards for evaluating such impacts, general considerations for community noise environments are that a change of over 5 dBA is readily noticeable and, therefore, is considered a significant impact (refer to Table 3.4-6, *Significance of Changes in Cumulative Noise Exposure*).[3] Changes from 3 to 5 dBA may be noticed by some individuals and are,

TABLE 3.4-6
SIGNIFICANCE OF CHANGES IN CUMULATIVE NOISE EXPOSURE

Ambient Noise Level Without Project (Ldn or CNEL)	Significant Impact Assumed to Occur if the Project Increases Ambient Noise Levels by:
< 60 dBA	+ 5.0 dBA or more
60-65 dBA	+3.0 dBA or more
> 65 dBA	+1.0 dBA or more

Sources: FICON, FHWA, and Caltrans as applied by Brown-Buntin Associates, Inc., 1997.

[3] Assessment of Noise with Respect to Community Response, ISDR 1996, International Standardization, Switzerland.

therefore considered an adverse environmental impact, since under these conditions sporadic complaints may occur. Changes in community noise levels of less than 3 dBA are normally not noticeable and are therefore considered less than significant.[4] Adverse impacts would result if increases in noise levels are audible (increases equal to, or greater than 3 dBA), although the noise level may not exceed the significant impact criteria specified above.

IMPACT 3.4-A Short Term Construction Noise Impacts: Grading and construction within the project area would result in temporary noise impacts to nearby noise sensitive receptors. Construction noise impacts would be temporary, and would be required to comply with City of Lodi Municipal Code requirements. With compliance to the City Code and recommended mitigation measures, impacts would be less than significant. (Less Than Significant With Mitigation).

Construction activities generally occur in a short and temporary duration, lasting from a few days to a period of months. Groundborne noise and other types of construction related noise impacts would typically occur during the initial site preparation, which tends to create the highest levels of noise. Generally, site preparation has the shortest duration of all construction phases. Activities that occur during this phase include earthmoving and soil compaction. High groundborne noise levels and other miscellaneous noise levels can be created during this phase due to the operation of heavy-duty trucks, backhoes, and front-end loaders.

Noise levels typically range from 73 to 96 dBA at a range of 50 feet from individual pieces of equipment.[5] Table 3.4-7, *Typical Construction Equipment Noise Levels*, represents a "worst-case" scenario in which all equipment used during a given phase is operating simultaneously. Since in most cases all equipment would not be operating during construction, actual noise levels would be lower than the levels presented in Table 3.4-7.

TABLE 3.4-7
TYPICAL CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	Maximum Level, dB (at 50 feet away from equipment)
Scrapers	88
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85

Source: "Handbook of Noise Control," prepared by Cyril Harris, 1979.

[4] Fundamentals and Abatement of Highway Traffic Noise, Bolt, Beranek and Newman, 1973.
[5] United States EPA, 1971.

A reasonable worst-case assumption is that the 3 loudest pieces of equipment would operate simultaneously and continuously over at least 1 hour. The combined sound level of 3 of the loudest pieces of equipment listed in Table 3.4-7 (scraper, bulldozer and heavy truck) is 92 dBA measured at 50 feet from the noise source. Table 3.4-8, *Estimated Construction Noise In The project Area*, which assumes this combined source level, summarizes predicted noise levels at various distances from an active construction site. These noise level estimates of noise levels take into account distance attenuation, attenuation from molecular absorption and anomalous excess attenuation[6].

TABLE 3.4-8
ESTIMATED CONSTRUCTION NOISE IN THE PROJECT AREA

Distance Attenuation	
Distance to Receptor (Feet)	**Sound Level at Receptor (dBA)**
50	92
100	86
200	80
400	73
600	69
800	67
1,000	64
1,500	60
2,000	57
2,500	54
3,000	51
4,000	47
5,280	43
7,500	36

The following assumptions were utilized:
Basic sound level drop-off rate: 6.0 dB per doubling distance
Molecular absorption coefficient: 0.7 dB per 1,000 feet
Analogous excess attenuation: 1.0 dB per 1,000 feet
Reference sound level: 92 dBA
Distance for reference sound level: 50 feet
Assumes simultaneous operation of 1 scraper, 1 heavy truck and 1 bulldozer

[6] Hoover, R. M., and R. H. Keith. 1996. *Noise control for buildings, manufacturing plants, equipment and products.* Houston, TX: Hoover & Keith, Inc.

Construction noise would be most noticeable during the initial months of site-intensive grading and building construction. Noise sensitive receptors in proximity to the construction site, which includes the residential community along Taylor Road, would experience increased noise levels resulting from construction activities. The residences along Taylor Road are located north of the project and would receive little to no attenuation from construction noise levels. However, a buffer zone that is approximately 200 feet would run between the northern project limits to Taylor Road. As shown on Table 3.4-8, noise levels at 200 feet for a worst-case construction scenario are 80 dB. This assumption is a worst-case scenario since multiple pieces of equipment would have to be operating along the northern project boundary to achieve this level. The residences along Taylor Road typically feature one-story structures and are situated so that the front yards face the project site.

The City of Lodi Municipal Code (Section 9.24.050) exempts any sound equipment under a City license or permit. Construction activities would need to authorized 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, construction work would be limited to the hours of 7:00 a.m. to 7:00 p.m. on weekdays, between 9:00 a.m. and 6:00 p.m. on Saturdays or when the City Building Inspector approves special provisions for construction activities.

Construction noise would also cause increased noise along access routes to the site due to movement of equipment and workers on the site. The primary heavy construction equipment/vehicles are expected to be moved on-site during the initial construction period and would have a less than significant short-term noise impact affect on nearby roadways. Daily transportation of construction workers is not expected to cause a significant effect since this traffic would not be a substantial percentage of current daily volumes in the area and is not be anticipated to increase traffic noise levels by more than 1 dBA.

The import of 50,000 cubic yards[7] of soil from an off-site location would be required for the proposed development. Transporting this volume of soil would involve approximately 21 inbound and 21 outbound daily truck trips for a period of approximately 200 days, based upon an average truckload of 12 cubic yards (as calculated in Section 3.3, Air Quality). The haul route for the soil import is anticipated to commence along Lower Sacramento Road, south of Kettleman Lane, on to the project site.

The additional soil transport traffic along Lower Sacramento Road would result in an average 0.3 dB increase in traffic noise levels along the roadway segment. This increase is not significant. Increases along other roadway segments of the haul route would be less than 0.3 dB[8] and, therefore, construction vehicles utilized for the project would result in a less than significant noise impact.

Implementation of the recommended mitigation (i.e., muffling/ placement of construction equipment and stockpiling/staging of construction vehicles) and compliance with Code requirements as outlined above, would serve to minimize the length of time residents are exposed to significant noise levels. Additionally, it should be noted that the estimated construction noise levels do not account for any noise attenuation due to existing topography. These factors may account for an acoustical attenuation level of up to 3 dBA. The primary sources of acoustical disturbance would be random incidents,

[7] Per conversation with Paul Smith, Project Applicant, December 2, 2002.
[8] Based upon modeling results utilizing the FHWA-RD-77-108 model.

which would last less than one minute, such as dropping large pieces of equipment or the hydraulic movement of machinery lifts. With adherence to the Municipal Code and due to the relatively short period of construction, noise and vibration impacts are concluded to be less than significant. Based upon the nominal increase in construction noise levels, additional mitigation measures beyond the City Code and limitation of construction hours is not required.

Mitigation 3.4-A.1: Prior to Grading Permit issuance, the Grading Plan shall be reviewed and approved by the Community Development Department to ensure compliance with the following:

- **All construction equipment, fixed or mobile, shall be equipped with properly operating and maintained mufflers, to the satisfaction of the Building Official.**
- **During construction, stationary construction equipment shall be placed such that emitted noise is directed away from sensitive noise receivers, to the satisfaction of the Building Official.**
- **During construction and to the satisfaction of the Building Official, stockpiling and vehicle staging areas shall be located as far as practical from noise sensitive receptors during construction activities.**

Mitigation 3.4-A.2: Construction work will be limited to the hours of 7:00 a.m. to 7:00 p.m. on weekdays, between 9:00 a.m. and 6:00 p.m. on Saturdays or when the City Building Inspector approves special provisions for construction activities.

IMPACT 3.4-B Long Term Noise Impacts: Implementation of the proposed project would generate additional vehicular travel on the surrounding roadway network, thereby resulting in noise level increases. Noise modeling indicates that a less than 3dBA increase due to the increase in traffic levels would result under the Existing Plus Approved Projects Plus Project and the Future (Year 2025) Plus Project conditions resulting less than significant impacts. (Less Than Significant Impact).

In accordance with the project Traffic Study, mobile source noise impacts on the surrounding street network were modeled for Existing, Existing Plus Approved Projects, Existing Plus Approved Projects Plus Project, Future (Year 2025) and Future (Year 2025) Plus Project conditions. These five scenarios were modeled to demonstrate the project's net acoustical increase over existing and future ambient conditions. Since the City of Lodi lacks a quantifiable threshold for assessing noise impacts, a change of over 5 dBA is considered a significant impact. In Tables 3.4-9 and 3.4-10, the first contour (dBA at 100 feet from centerline) depicts the noise level that would be heard 100 feet perpendicular to the roadway centerline (it should be noted that estimates only identify traffic noise generated along a specific roadway segment and does not adjust for any existing noise barriers or differences in elevation). This is the typical distance to the midpoint of a rear yard for a receptor adjacent to a roadway. The second contour (distance from roadway centerline) illustrates the distances for which various noise levels would be encountered. The distance from centerline, which is the midpoint of the roadway cross section, depicts the spreading effect of the acoustics generated by mobile sources.

Existing Plus Approved Projects Plus Project Noise Analysis. Project noise impacts would result from attracting additional vehicular travel on the surrounding road networks. As the majority of the project traffic would travel along Kettleman Lane and Lower Sacramento Road, the project would contribute to noise level increases along these roadways. The projected traffic changes were applied to the Federal Highway Administration (FHWA) Model to estimate future CNEL noise levels based on traffic.

Table 3.4-9, *65 CNEL Contour Projections (Existing Plus Approved Projects Plus Project),* details the locations of the noise levels from the roadway centerline. As indicated in Table 3.4-9, without the proposed project, the 65 CNEL contour would extend from 66 to 120 feet along Kettleman Lane and 71 to 98 feet along Lower Sacramento Road.

The proposed project would not create significant mobile noise impacts along the analyzed roadway segments. As indicated in Table 3.4-9, the project would cause traffic noise levels to increase by a maximum of 1.0 dBA along the roadway segments analyzed. As indicated in Table 3.4-9, with the proposed project, the 65 CNEL contour would extend from 78 to 133 feet along Kettleman Lane and 80 to 115 feet along Lower Sacramento Road. As previously noted, changes in community noise levels of less than 3 dBA are normally not noticeable and are therefore considered less than significant.

TABLE 3.4-9
65 CNEL CONTOUR PROJECTIONS
(EXISTING PLUS APPROVED PROJECTS PLUS PROJECT)

Existing + Approved Projects						Existing + Approved Projects + Project					Difference in DBA @100 Feet from Roadway
Roadway Segment	ADT	DBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	DBA @ 100 feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			
			60 Ldn Noise Contour	65 Ldn Noise Contour	70 Ldn Noise Contour			60 Ldn Noise Contour	65 Ldn Noise Contour	70 Ldn Noise Contour	
Kettleman Lane:											
West of Lower Sacramento	10,580	62.0	143	66	31	13,570	63.0	169	78	36	1.0
East of Lower Sacramento	25,610	65.3	258	120	56	30,095	66.0	287	133	62	0.7
Lower Sacramento Road:											
Taylor Road to Kettleman Lane	18,845	64.0	210	98	45	24,075	65.0	247	115	53	1.0
South of Kettleman Lane	11,695	62.4	153	71	33	13,935	63.2	172	80	37	0.8

Modeled results calculated using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters.

Future (Year 2025) Plus Project Noise Analysis. This condition includes Year 2025 traffic volumes obtained from the Project Traffic Study. As indicated in Table 3.4-10, *65 CNEL Projections (Future Plus Project)*, the 65 CNEL contour would extend between 108 to 137 feet along Kettleman Lane and 134 to 147 feet along Lower Sacramento Road without the proposed project.

With the addition of project traffic, the 65 CNEL contour along Kettleman Lane would range between 110 and 140 feet and 136 to 149 feet along Lower Sacramento Road. The project traffic would add 1.0 dBA when compared to without project conditions at 100 feet from the roadway source. A less than significant cumulative impact would occur in this regard.

TABLE 3.4-10
65 CNEL CONTOUR PROJECTIONS
(FUTURE PLUS PROJECT)

Roadway Segment	Future (Year 2025)					Future (Year 2025) + Project					Difference in DBA @100 Feet from Roadway
	ADT	DBA @ 100 Feet from Roadway Centerline	Distance from Roadway Centerline to: (Feet)			ADT	DBA @ 100 feet from Roadway Cnterline	Distance from Roadway Centerline to: (Feet)			
			60 Ldn Noise Contour	65 Ldn Noise Contour	70 Ldn Noise Contour			60 Ldn Noise Contour	65 Ldn Noise Contour	70 Ldn Noise Contour	
Kettleman Lane:											
West of Lower Sacramento	22,000	65.1	233	108	50	22,640	65.3	237	110	51	0.2
East of Lower Sacramento	31,400	66.2	295	137	64	32,310	66.3	301	140	65	0.1
Lower Sacramento Road:											
Taylor Road to Kettleman Lane	30,300	66.0	288	134	62	31,180	66.2	294	136	63	0.2
South of Kettleman Lane	34,800	67.1	316	147	68	35,810	67.3	322	149	69	0.2

Note: Modeled results calculated using the Federal Highway Administration's Highway Noise Prediction Model (FHWA RD-77-108) together with several roadway and site parameters.

Overall, the project would not result in cumulatively significant mobile noise impacts along the roadway segments analyzed. As indicated in Table 3.4-10, mobile source noise level increases along the roadway segments analyzed would be a maximum of 0.2 dBA. Changes in community noise levels of less than 3 dBA are normally not noticeable and are therefore considered less than significant.

Mitigation 3.4-B: The project would result in less than significant long term noise impacts, therefore no mitigation is required. (Less Than Significant Impact).

Impact 3.4-C Stationary Noise Impacts: Implementation of the proposed project would result in the generation of on-site noise associated with retail commercial activities that include loading/unloading activities, operation of mechanical equipment (e.g. air conditioning units) and activities occurring in parking lots. Stationary source impacts would result in a significant impact. (Significant Impact)

The major noise sources associated with the proposed Lowe's, Winco Foods and other subsidiary uses that may impact nearby residences include: slowly moving trucks on the project site, trucks approaching and leaving the loading docks, activities at the loading docks themselves, the unloading of lumber, trash compactors and roof-top mechanical equipment. Primary sources of noise in the project area would be Winco Foods and Lowe's, since they receive the majority of deliveries and are adjacent to sensitive land uses. The following is an analysis of each major stationary noise source. It is assumed in the analysis that an eight-foot masonry wall on the north side of the project would be constructed but that no other noise attenuating measures are provided.

Winco Foods is expected to receive approximately four general truck deliveries and two refrigerated truck deliveries each day. Lowe's estimates five tractor/trailer deliveries per day. Some of these would be for lumber. Receiving hours for Lowe's would generally occur between 7:00 a.m. and 5:00 p.m., however, trailers could be dropped off late at night or in the early morning.

Trucks would enter along Lower Sacramento Road and travel along the north side of the Shopping Center to access loading docks. The approximate distances to the center of backyards of the adjacent residents would be as follows:

- Along the north side of the proposed Lowe's, approximately 80 feet from truck travel lanes.
- Along the north side of the proposed Winco Foods, approximately 80 feet from truck travel lanes.

The maximum (Lmax) level of slowly moving heavy and small trucks are approximately 73 and 70 dBA, respectively, at a distance of 50 feet. Assuming a standard rate of attenuation of 6 dB doubling of distance for a slowly moving point source, the Lmax in backyards north of Lowe's and Winco Foods would be 69 dBA. In terms of the Leq, noise levels would range from 40-45 dB for both the proposed Winco Foods and Lowe's. Since the City of Lodi lacks a quantifiable threshold for assessing noise impacts, general considerations for community noise environments are that a change of over 5 dBA is readily noticeable and, therefore, is considered a significant impact. Stationary noise levels would be noticeable and higher than normal ambient levels due to the distinctive type of use and noise emanations. Since noise levels in this area range from 37.8 to 64.0 dB during the peak hour, noise levels from slowly moving trucks would exceed the City's noise level criteria and an unavoidable significant impact would occur in this regard.

Additional Noise Sources

Loading Docks

The Lowe's and Winco Foods loading docks would be located approximately 130 feet from the nearest homes (G-REM residential) to the north. Noise sources at loading docks may include short-term idling of truck engines, operation of truck refrigeration units (not anticipated to continually operate due to unloading upon arrival) and fork lifts, banging of hand carts and roll-up doors, noise from P.A. systems, and voices of truck drivers and store employees.

Reference noise levels during a typical busy hour near a supermarket loading dock were conducted by Brown-Buntin[9] for a similar project. During a one-hour period, two heavy trucks made deliveries to the loading dock and departed. In addition, reference noise levels from several types of refrigerated trucks have been conducted by Brown-Buntin. Refrigerated trucks would make deliveries at the proposed Winco Foods store. Table 3.4-11 *Reference Levels at 75 Feet From Loading Dock*, shows the reference noise levels of loading docks. Based on the data in Table 3.4-11, and again assuming the standard point source noise attenuation of 6 dB/doubling of doubling of distance, the loading dock noise levels shown in Table 3.4-12, *Loading Dock Noise Levels at Nearest Residences,* would occur at the nearest residences. Implementation of the recommended mitigation involving construction of a masonry block wall along the northern property line would reduce noise levels up to 5 dBA, however, it would not reduce noise levels to a less than significant level.

TABLE 3.4-11
REFERENCE LEVELS AT 75 FEET FROM LOADING DOCK

	Noise Level, dBA	
	Leq	**Lmax**
With Refrigerated Trucks	53	73
Without Refrigerated Trucks	45	73

Source: Acoustical Analysis for the Proposed Lowe's and Wal-Mart in Bakersfield, California, Brown-Buntin Associates, July 17, 2002.

Lumber Unloading

Lumber unloading would occur along the rear portion of the Lowe's store. Reference noise level measurements of the unloading of lumber were conducted by Brown-Buntin at another home improvement store. The main noise sources associated with this activity were forklift operations, delivery truck idling, and the banging and clanging of lumber. At a distance of 50 feet, the measured Leq and Lmax from this activity was 57 to 75 dBA, respectively. At the nearest residences, the predicted Leq and Lmax noise levels would be approximately 44 and 62 dBA, respectively. These noise levels do not exceed the City's standards, and no impact would occur in this regard.

[9] Acoustical Analysis for the Proposed Lowe's and Wal-Mart in Bakersfield, Califomia, Brown-Buntin Associates, July 17, 2002.

TABLE 3.4-12 LOADING DOCK NOISE LEVELS AT NEAREST RESIDENCES		
	Noise Level, dBA	
	Leq	Lmax
Lowe's	48	68
Winco Foods	48	68
Source: Acoustical Analysis for the Proposed Lowe's and Wal-Mart in Bakersfield, California, Brown-Buntin Associates, July 17, 2002.		

Trash Compactors

Based on information gathered by Brown-Buntin, the Sound Exposure Level (SEL) of a trash compactor is 83.9 dBA at 45 feet. The approximate Lmax would be 76 dBA at 45 feet (the Lmax is usually 8-10dB less than the SEL assuming an event of approximately 30 seconds). Assuming trash compactors are at the rear of the proposed buildings, the distance to the nearest residences from the Lowe's and Winco Foods compactors would be approximately 130 feet. Using the standard 6 dB/doubling of distance attenuation factor, the Lmax values at the residences at the rear of Lowe's and Winco Foods would be approximately 68 dBA. These levels would not exceed the City's criteria and a significant impact would occur in this regard. It is recommended that the dumpsters be placed in a location that is not adjacent to sensitive land uses, or that the dumpsters be shielded by a wall or other structure.

Rooftop Air Conditioners

Air conditioner units ranging from one to 20 tons are assumed would be placed on the roof of the proposed Lowe's and Winco Foods stores. At a distance of 90 feet, the noise level from all units operating simultaneously would be approximately 54 dBA. A 5-foot parapet is proposed along the roof edge of both stores, which would provide approximately 6 dBA of attenuation. The resulting noise level at 90 feet would be approximately 48 dBA. This noise level would not exceed the City's criteria and no impact would occur in this regard

Mitigation 3.4-C.1: Loading dock facilities, rooftop equipment, trash compactors, dumpsters and other stationary noise sources shall be adequately shielded and/or located at an adequate distance from residential areas to the satisfaction of the Community Development Director

Mitigation 3.4-C.2: Directional speakers shall be shielded and/or oriented away from off-site residences to the satisfaction of the Community Development Director

Impact 3.4-D Cumulative Noise Impacts: Implementation of the proposed project, combined with cumulative projects, would increase the ambient noise levels in the site vicinity. Impact analysis and mitigation of impacts are determined on a project-by-project basis.

Implementation of the proposed project, combined with development of cumulative projects, would increase ambient noise levels in the site vicinity. This increase would be due to both vehicular traffic noise along local roadways and stationary noise sources associated with development. The evaluation of noise impacts is typically determined on a project-by-project basis in order to focus mitigation on a particular noise source. As such, future development proposals within the City would require separate discretionary approval and CEQA assessment, which would address potential noise impacts and identify appropriate attenuation measures where appropriate. As previously stated above, the proposed project, as well as cumulative development projects, would be individually required to reduce noise impacts to below City noise standards and demonstrate adherence to Municipal Code requirements.

Mitigation 3.4-D: The project would have a less than significant impact related to Cumulative Noise Impacts therefore no mitigation is required.