4.10 NOISE

This section evaluates the noise impacts upon existing and future noise sensitive receivers in and around the project area. The chapter includes background information on acoustics, a summary of the regulatory framework, a description of existing noise conditions and a general discussion of the project specific and cumulative impacts. This section was prepared by Illingworth & Rodkin and included a peer review of a Noise Barrier Analysis prepared by Charles M. Salter Associates Inc.[1] A full copy of that analysis is available as part of the project application at City Hall.

A. Fundamental Concepts of Environmental Acoustics

Noise may be defined as unwanted sound. The objectionable nature of the sound could be caused by its pitch or its loudness. Pitch is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. Loudness is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave. Technical terms are defined in Table 4.10-1.

1. Noise Measurement

In addition to the concepts of pitch and loudness, there are several noise measurement scales which are used to describe noise in a particular location. A decibel (dB) is a unit of measurement which indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 dB represents a ten-fold increase in acoustic energy, while 20 dB is 100 times more intense, 30 dB is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10 dB increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities.

There are several methods of characterizing sound. The most common in California is the A-weighted sound level (dBA). All sound levels in this report are A-weighted, unless reported otherwise. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels are shown in Table 4.10-2.

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[1] Environmental Noise Study East Washington Place, Petaluma, California, prepared for Regency Centers by Charles M. Salter Associates, Inc., November 8, 2004.

TABLE 4.10-1 **DEFINITIONS OF ACOUSTICAL TERMS**

Term	Definitions
Decibel, dB	A unit describing the amplitude of sound.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	Decibel level as measured using the A-weighting filter network which de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlating well with subjective reactions to noise. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels to sound levels measured from 7:00 p.m. to 10:00 p.m. and 10 decibels to sound levels measured between 10:00 p.m. and 7:00 a.m.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 p.m. and 7:00 a.m.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	Noise which intrudes over and above the existing ambient noise at a given location. Relative intrusiveness depends on amplitude, duration, frequency, time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Source: Illingworth & Rodkin, 2008.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called Leq. The most common averaging period is hourly, but it can be of any duration.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that give penalties to quiet-time noise events. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 p.m. - 10:00

TABLE 4.10-2 **TYPICAL SOUND LEVELS**

Outdoor Sound	dBA	Indoor Sound	Threshold
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110		
Diesel Pile Driver (100')	100	Rock Music Concert	Very Loud
	90	Boiler Room Printing Press Plant	
Freight Cars (50')	80		
	70	In Kitchen With Garbage Disposal Running	Moderately Loud
Freeway (100') Vacuum Cleaner (10')	60	Data Processing Center	
Light Traffic (100') Large Transformer (200')	50	Department Store	
	40	Private Business Office	
Soft Whisper (5')	30	Quiet Bedroom	Quiet
	20		
	10	Recording Studio	
	0		Threshold of Hearing

Source: Illingworth & Rodkin, 2008.

p.m.) and a 10 dB addition to nocturnal (10:00 p.m. - 7:00 a.m.) noise levels. The Day/Night Average Sound Level, L_{dn}, is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

The Occupational Safety and Health Administration (OSHA) has a noise exposure standard which is set at the noise threshold where hearing loss may occur from long-term exposures. The maximum allowable level is 90 dBA averaged over eight hours. If the noise is above 90 dBA, the allowable exposure time is correspondingly shorter.

2. Effects of Noise

a. Sleep and Speech Interference

The thresholds for speech interference indoors are about 45 dBA if the noise is steady and about 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise above 35 dBA and fluctuating noise levels above about 45 dBA have been shown to affect sleep.

b. Annoyance

Causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The L_{dn} as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. The threshold for annoyance from vehicle noise is about 55 dBA L_{dn}. At an L_{dn} or CNEL of about 60 dBA, approximately eight percent of the population is highly annoyed. When the L_{dn} or CNEL increases to 70 dBA, the percentage of the population highly annoyed increases to about 25-30 percent of the population. There is, therefore, an increase of about two percent per dBA between an L_{dn} or CNEL of 60 to 70 dBA.

B. Regulatory Framework

1. Federal Regulations

There are no federal standards or controls applicable to the noise assessment.

2. State Regulations

There are no state standards or controls applicable to the noise assessment.

3. Local Regulations

a. Petaluma General Plan

The Community Health and Safety Element of the General Plans establishes policies intended to guide the development of new projects with regard to exposure to or generation of noise.

Applicable goals and policies from the General Plan are shown in Table 4.10-3.

b. Petaluma Zoning Ordinance

Per Section 22-301 of the City's Zoning Ordinance, noise generating construction activities are limited to the hours of 7:00 a.m. to 10:00 p.m. on weekdays and 9:00 a.m. to 10:00 p.m. on weekends and holidays. For daily operational noise, the Noise Ordinance generally establishes an hourly average level of 60 dBA Leq as the maximum that may be generated on one land use that would be affecting another land use, and the allowable levels are adjusted to account for the ambient noise level.

TABLE 4.10-3 **PETALUMA GENERAL PLAN POLICIES AND PROGRAMS**

Policy/Program Number	Policy
Noise Element	
10-P-3	Protect public health and welfare by eliminating or minimizing the effects of existing noise problems, and by minimizing the increase of noise levels in the future.
10-P-3 (A)	Continue efforts to incorporate noise considerations into land use planning decisions, and guide the location and design of transportation facilities to minimize the effects of noise on adjacent land uses.
10-P-3 (B)	Discourage location of new noise-sensitive uses, primarily homes, in areas with projected noise levels greater than 65 dB CNEL. Where such uses are permitted, require incorporation of mitigation measures to ensure that interior noise levels do not exceed 45 dB CNEL.
10-P-3 (C)	Ensure that the City's Noise Ordinance and other regulations: ♦ Require that applicants for new noise sensitive development in areas subject to noise levels greater than 65 dB CNEL obtain the services of a professional acoustical engineer to provide a technical analysis and design of mitigation measures.
10-P-3 (D:	Continue to require control of noise or mitigation measures for any noise-emitting construction equipment or activity. ♦ The City's Noise Ordinance establishes controls on construction-related noise.
10-P-3 (E)	As part of development review, use Figure 10-2: Land Use Compatibility Standards to determine acceptable uses and installation requirements in noise-impacted areas.
10-P-3(G)	In making a determination of impact under the California Environmental Quality Act (CEQA), consider an increase of four or more dBA to be "significant" if the resulting noise level would exceed that described as normally acceptable for the affected land use in Figure 10-2: Land Use Compatibility Standards.

Source: City of Petaluma General Plan 2025.

C. Existing Conditions

The project site is located adjacent to the southwest quadrant of the Highway 101 East Washington Street Intersection. Highway 101 borders the east side of the site and generally wraps around the south side, East Washington Street borders the north side of the site and Kenilworth Avenue borders the west side of the site. The Sonoma-Marin Fairgrounds, including the Petaluma Speedway and the Nor Cal Paintball Park, is located adjacent to the site to the west across Kenilworth Avenue. One sensitive receptor, the Live Oak Charter School is located at the Fairgrounds, about 350 yards from the project site. Live Oak Charter School has a current enrollment of 225 students in grades K-7. The city-owned swim center and skate park are also located to the west along East

Washington Street. Major noise sources affecting the project site are vehicular traffic on Highway 101 and East Washington Street. Races at the Petaluma Speedway on Saturday afternoons and evenings during the spring, summer and fall also are a significant noise source at the project site. In addition, the periodic use of air-powered rifles at the paintball park can be heard at the project site.

Noise levels were measured at the project site in May and September 2004.[2] The noise measurement locations shown on Figure 4.10-1, were selected to characterize the noise exposure at the project site and at nearby noise sensitive receptors, the skate park and swim center. Four long-term, 24-hour, continuous measurements were made and five short-term, 15-minute, measurements were made. Table 4.10-4 summarizes the measurement results and locations. As noted earlier, the most significant noise source affecting the project site is vehicular traffic on Highway 101. The side of the project site fronting the freeway is exposed to a noise level of 82 dBA CNEL. Measurements made along East Washington Street indicate that the site is exposed to 75 dBA CNEL due to a combination of East Washington Street traffic and noise from the freeway. Along Kenilworth Drive, the noise environment results from traffic on Highway 101, East Washington Street near the northern end of the site, and intermittent activity in the parking lots and at the Sonoma-Marin Fairgrounds. Noise exposure along Kenilworth Drive is typically about 64 dBA CNEL. The 24-hour average noise level increased to 69 dBA CNEL on Saturday, May 8, 2004 during a scheduled event at the Petaluma Speedway.

In 2008 the Petaluma Speedway events began on March 8 and concluded on October 18, 2008. On a typical Saturday the pit gates open at 3:00 p.m., the grandstand gates open at 4:30 p.m., qualifying heat races start at 5:30 p.m. and the main events start at 7:00 p.m.[3] Noise levels were monitored at location LT-2 by Illingworth & Rodkin during the race activities on Friday June 16 and on Saturday, June 17, 2006. The purpose for this supplementary monitoring was to gather more detailed information on noise levels that actually occur during the racing event. Figure 4.10-2 shows the measured average and maximum noise levels in 10-minute intervals on Friday night, June 16th and Saturday night, June 17th. The data show the influence of pre-race activities, and the races themselves on the measured noise levels. The average noise level from 5:00 p.m. to 10:00 p.m. on Friday evening was 58 dBA Leq and the average noise level during this time period on Saturday evening was 71 dBA Leq. Noise levels during the race event increased 13 dBA as a result of the Saturday night racing. Other activities observed on the night of June 17th that made a significant contribution to measured noise levels included cars driving fast up and down Kenilworth Drive, automobiles, support equipment, and loud voices from the race staging area.

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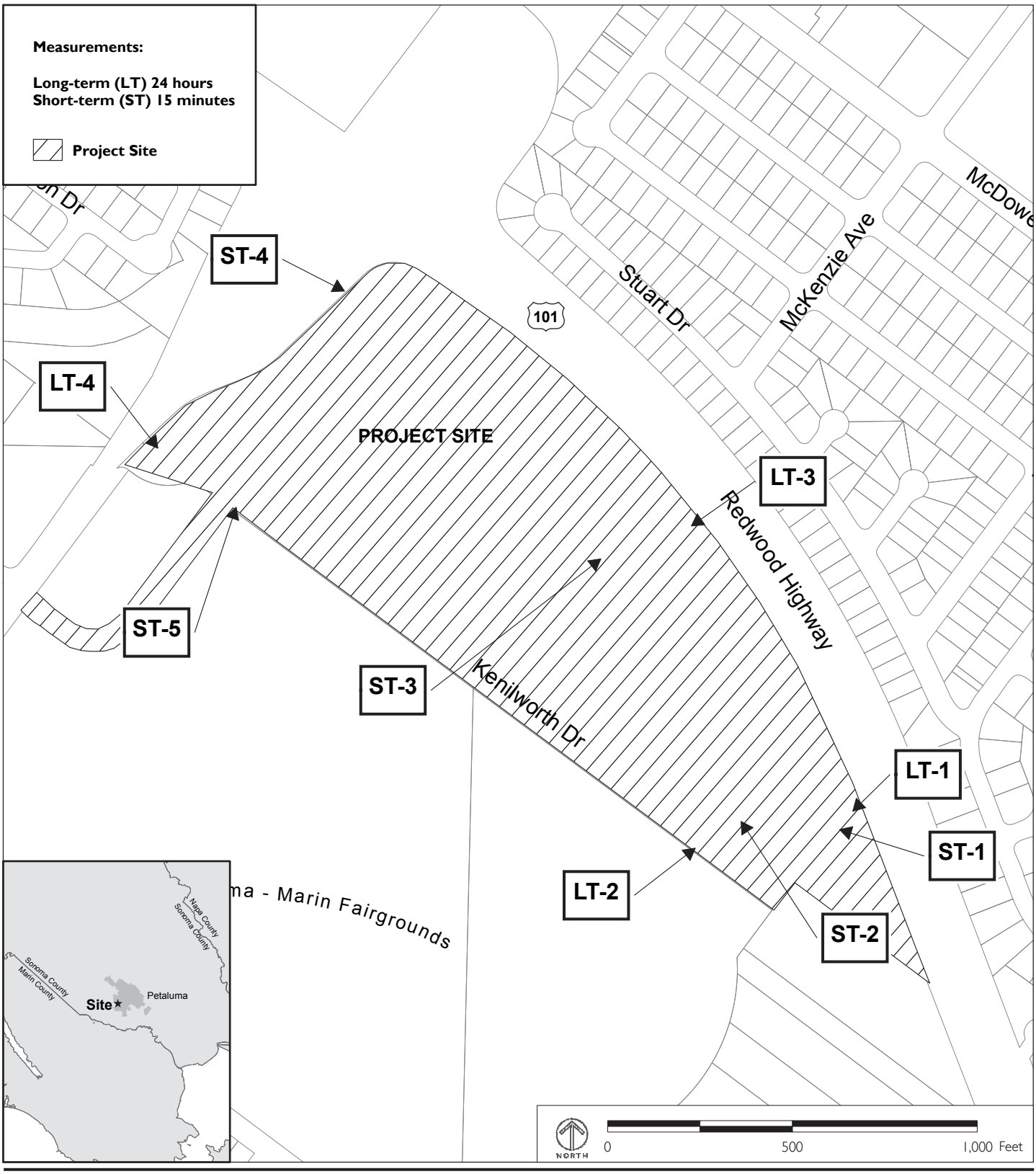
[2] Environmental Noise Study East Washington Place, Petaluma, California, prepared for Regency Centers by Charles M. Salter Associates, Inc., November 8, 2004.

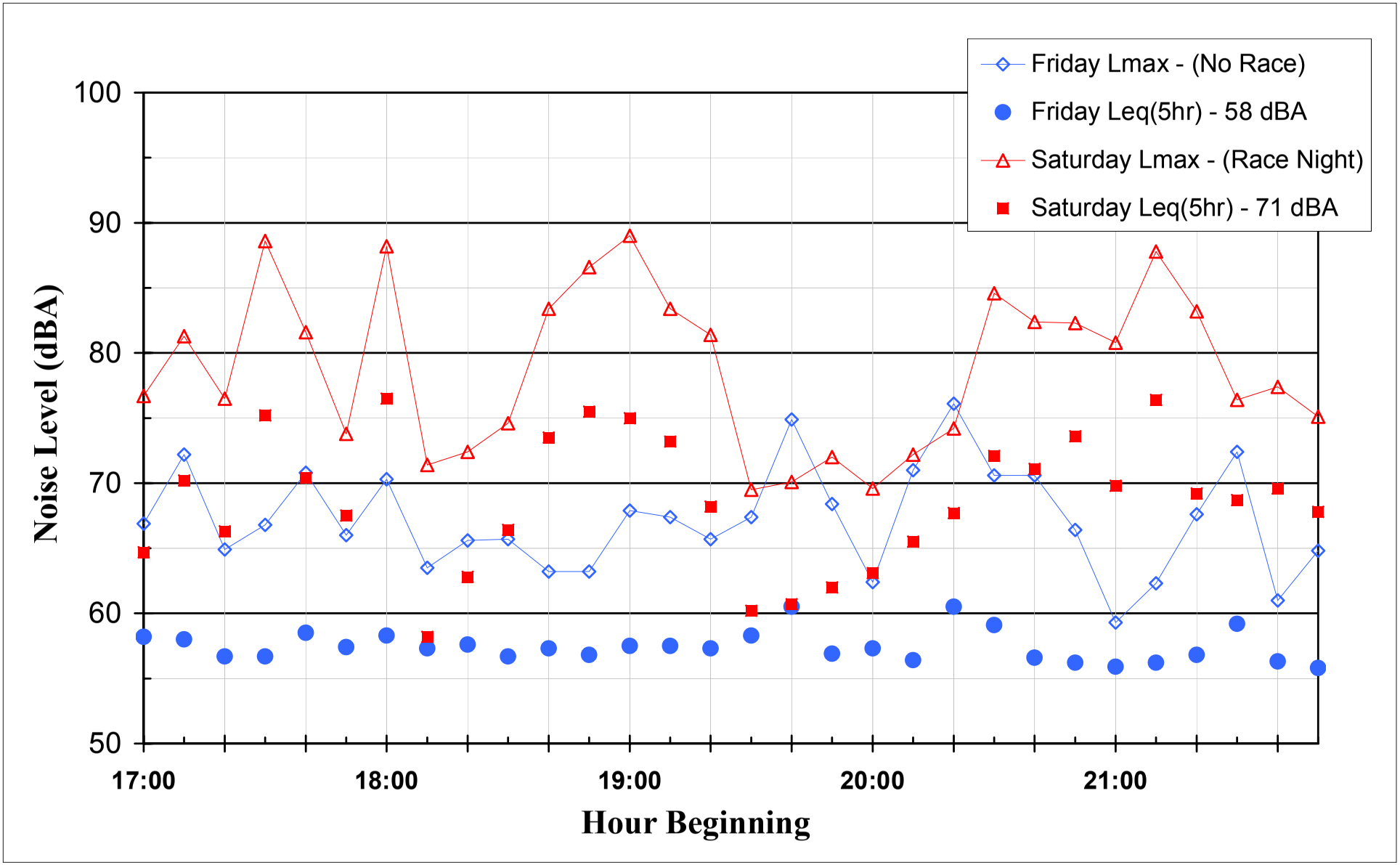
[3] Petaluma Speedway website, www.petaluma-speedway.com. Accessed November 21, 2008 by Leslie Wilson, DC&E.



Source: Charles M. Salter Associates, DC&E.

FIGURE 4.10-1

NOISE MEASUREMENT LOCATIONS AT THE PROJECT SITE



Source: Illingworth & Rodkin, Inc.

FIGURE 4.10-2

PETALUMA SPEEDWAY NOISE LEVEL COMPARISON AT LT-2 ON JUNE 16 AND JUNE 17, 2006

TABLE 4.10-4 **EXISTING NOISE LEVELS AT THE PROJECT SITE**

Location		CNEL (dBA)
LT-1	Along northeastern property line, adjacent to US-101. Approximately 100-feet from centerline of US-101	82
LT-2	Along southwestern property line, adjacent to Petaluma Speedway. Approximately 600-feet from centerline of US 101 (typical day without Speedway).	64
	May 8, 2004 including Racing Event at Petaluma Speedway	69
LT-3	Along northeastern property line, adjacent to US 101. Approximately 285-feet from centerline of US 101.	75
LT-4	Along northwestern property line, adjacent to East Washington Street. Approximately 30-feet from centerline of East Washington Street.	75
ST-1	Approximately 250-feet from centerline of US 101. Approximately 2200-feet from centerline of East Washington Street.	74*
ST-2	Approximately 450-feet from centerline of US 101. Approximately 1900-feet from centerline of East Washington Street.	67*
ST-3	Approximately 585-feet from centerline of US 101. Approximately 1200-feet from centerline of East Washington Street.	65*
ST-4	Along northern property line, adjacent to US 101 southbound on-ramp. Approximately 40-feet from centerline of US 101 southbound on-ramp.	75*
ST-5	Along Kenilworth Drive, adjacent to East Washington Street. Approximately 405-feet from centerline of East Washington Street.	61*

* CNEL determined by comparing short-term measurement to long-term measurement.

Nor Cal Paintball Park operates on the Fairgrounds as well. Its hours of operation are on Fridays from 7:00 p.m. to 11:00 p.m., and Saturdays and Sundays from 9:00 a.m. to 3:30 p.m. The primary source of noise at the park is air-powered paintball rifles and voices. As clarified below in the impacts discussion, noise levels were not specifically measured at the paintball park because noise-reduction components of the project used to mitigate noise from the speedway would adequately mitigate noise from the paintball park.

There are no existing sources of ground borne vibration on or adjacent to the project site. Similarly, the site is not within a noise contour area for an existing airport.

D. Standards of Significance

The proposed project would have a significant impact with regard to noise if it would:

1. Expose sensitive receptors (typically residential) to exterior noise levels of 65 dBA CNEL or higher or residents to interior noise levels higher than 45 dBA CNEL in any habitable room.
2. Cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
   - A +4 dBA CNEL increase in traffic noise levels where existing traffic noise levels exceed 60 dBA CNEL at the outdoor activity areas of noise sensitive uses.
3. Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
4. Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.
5. Expose people working or residing in the project to excessive noise levels in areas located within the airport land use plan or within the vicinity of a private airstrip.

E. Impact Discussion

The following provides an analysis of the general and specific impacts that may occur due to construction and operation of the proposed project.

1. Project Impacts

1. Expose sensitive receptors (typically residential) to exterior noise levels of 65 dBA CNEL or higher or residents to interior noise levels higher than 45 dBA CNEL in any habitable room.

As discussed in the project description, the proposed project includes retail and office development. There are no residential or other noise sensitive uses proposed as part of the project. The retail buildings are massed along the Highway 101 frontage providing an effective noise barrier for the circulation areas that would occur in front of the stores. Since there are no sensitive receptors within or adjacent to the site, the impact would be *less-than significant*.

2. Cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

The operation of the project would cause an increase in vehicular traffic on the street network. The noise impact of future project generated traffic, (including cumulative traffic generated by other projects) is calculated by adding project generated trips to future baseline traffic and comparing the volumes to existing traffic volumes on the street network. Calculated increases in traffic noise along roadway segments in the project area are less than 1 dBA CNEL except along Lindberg

Lane east and west of Payran Street where noise levels are calculated to increase 4 dBA CNEL and 2 dBA CNEL, respectively. East of Payran Street existing commercial uses are not sensitive to increased traffic noise. West of Payran Street, where there are residences, the increase of 2 dBA CNEL would not be substantial. Therefore, vehicular traffic from the proposed project would not cause a substantial increase in traffic noise at existing sensitive receptors in the area. Noise levels would not increase to levels higher than 45 dBA L_{dn} in the vicinity of sensitive receptors. Permanent ambient noise levels would not increase more than 5 dBA in areas where existing traffic levels are less than 60 dB L_{dn} nor would ambient noise levels increase more than 3 dBA in areas where existing traffic levels exceed 60 dBA L_{dn}. Therefore, this is a *less-than-significant* impact.

Under the General Plan build out conditions, there would also be an increase in vehicular traffic on the street network and a related increase in noise generated by vehicular traffic. Near term (2010) and Year 2025 traffic were analyzed using the General Plan's traffic model. Traffic noise increases along residential streets in the vicinity of the project area are calculated to be less than 4 dBA CNEL. The projected increase in vehicular travel would not have significant noise impacts on sensitive receptors.[4]

The retail component of the project site adjoins the existing city swimming pool and skate park. Vehicular traffic would enter and exit on the extension of Johnson Drive and the extension of Kenilworth Drive to East Washington Street. Traffic in this area would be low speed traffic, similar to what would be typical of a parking lot and is similar to existing traffic circulation in the area. The pool areas are largely buffered by the skate park, solar panel area, and existing buildings. Intermittent noise resulting from vehicle circulation is not expected to make a measurable or noticeable change in the noise environment at the pool or the skate park. This is a *less-than-significant* impact.

3. Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

During buildout of the project, construction noise from equipment would cause short-term localized increases in ambient noise levels. A significant impact resulting from construction noise would result if the noise level at a sensitive receptor would exceed 60 dBA Leq, and the ambient level by at least 5 dBA, and continue for more than one year. Sensitive receptors potentially affected by noise from project construction activities are users of the skate park and staff and users of the pool, and noise sensitive uses at the Fairgrounds, such as Live Oak Charter School. During the various construction phases noise from construction activities would range from about 78-88 dBA Leq at a reference distance of 50 feet from the center of activity. Busy construction activity periods within about 500 - 600 feet of sensitive receptors could cause noise levels to exceed 60 dBA Leq and to

[4] Whereas the cumulative analysis relating to the majority of topics analyzed in this EIR relies upon a list of reasonably foreseeable development, conclusions related to cumulative noise impacts are based on the cumulative traffic projections in the Year 2025.

increase by 5 dBA or more above ambient levels. There are no sensitive receptors within this distance that would be exposed to elevated noise levels for a period exceeding one year. Fairground tenants are located about 1,000 feet or more from the construction areas.

As specified in Policy 10-P-3(D) of the General Plan, the City would require control of noise following Best Management Practices for any noise-emitting construction equipment or activity based on construction-related noise controls specified in the City Ordinance. The City Zoning Ordinance (Chapter 22–301.3) regulates construction hours. Construction is prohibited between 10:00 p.m. and 7:00 a.m. on weekdays and between 10:00 p.m. and 9:00 a.m. on weekends and holidays. Potential noise impacts at distant receptors associated with nighttime construction are, therefore, mitigated by the allowable construction hours set forth in the Zoning Ordinance.

Failure to implement noise-reduction BMPs during the construction period, as specified above, could result in a substantial, temporary increase in ambient noise. This would result in a *significant* impact.

4. Expose persons to or generate excessive ground-borne vibration or ground-borne noise levels.

There are no known sources of ground borne noise or vibration that would affect the project site or would be generated on the project site. As a result, ground borne noise and vibration would have *no impact*.

5. Expose people working or residing in the project to excessive noise levels in areas located within the airport land use plan or within the vicinity of a private airstrip.

Aircraft do not contribute to measured noise levels at the project site. The closest airfield to the project site is the Petaluma Municipal Airport, located just under 2 miles away. The project is not within the projected noise contours of the Petaluma Municipal Airport.[5] Therefore, *no impact* would occur.

2. Cumulative Impacts

The future traffic projections used for the noise analysis were generated by a traffic model that considered the cumulative growth for the entire City of Petaluma to Year 2025, including the proposed project (see Chapter 4.13, Traffic). No significant impact associated with increased traffic noise was identified (see section E.1.c. above) and therefore there would not be a cumulative traffic noise-related impact.

[5] Figure AT-6, Air Transportation Element, Sonoma County General Plan 2020, Adopted September 23, 2008.

F. Impacts and Mitigation Measures

Impact NOI-1: Significant, temporary noise impacts could occur if the project does not implement noise-reduction best management practices (BMPs) during the construction period.

Mitigation Measure NOI-1: Project developers should require by contract specifications that the following construction BMPs be implemented by contractors to reduce construction noise levels:[6]

- Two weeks prior to the commencement of construction, notification must be provided to surrounding land uses disclosing the construction schedule, including the various types of activities that would be occurring throughout the duration of the construction period;
- Ensure that construction equipment is properly muffled according to industry standards;
- Place noise-generating construction equipment and locate construction staging areas away from residences and other sensitive noise receptors such as the school on the fairground site, where feasible;
- Schedule high noise-producing activities between the hours of 8:00 a.m. and 5:00 p.m. to minimize disruption on sensitive uses; and
- Implement noise attenuation measures to the extent feasible, which may include, but are not limited to, noise barriers or noise blankets.

Significance After Mitigation: Construction-period noise would be reduced to a *less-than-significant* level through this mitigation.

[6] Petaluma General Plan EIR, page 3.9-26.