COFFMAN ENGINEERS

Environmental Noise Study for:

Marin Catholic High School Field Lighting Project

Marin County, CA

Date:

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PREPARED FOR:

MARIN CATHOLIC HIGH SCHOOL
675 Sir Francis Drake Blvd.
Kentfield, CA 94904

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1 Introduction

This report is an update to the original report prepared in 2016 by RGD Acoustics, Inc. (currently Coffman Engineers, Inc.).

Marin Catholic High School (MCHS) is proposing to install a state-of-the-art field lighting system (the "Community Lights Initiative") to allow for certain evening use of the Dino Ghilotti Motta Stadium. As designed, the project includes four, 80-foot tall light poles installed at the 10 yard line on each side of the field. The project will allow for Friday evening football games and provide adequate field time for men's and women's soccer and lacrosse games and practices. The weekday games and practices would be spread out during the afternoon and evening so multiple teams are not practicing at the same time.

The project site consists of an athletic stadium with artificial turf field and a six-lane synthetic track that surrounds the perimeter of the field. There is a 1,242 seat home bleacher section and a 266 seat visitor section. Vehicle access is provided via Sir Francis Drake Blvd. and Bon Air Road.

This report analyzes the change in sound levels at nearby residential areas due to the project. The analysis includes acoustical measurements of the existing ambient noise environment at residences surrounding the project site as well as athletic games and practices. Project sound sources evaluated in the study include activities on the field, spectators and PA system, parking lot use and increased traffic on local roadways. The project generated sound levels are assessed with respect to the California Environmental Quality Act (CEQA) guidelines and the applicable implementing programs of the Marin Countywide Plan.

2 Executive Summary

The proposed project will result in an increase in school activities during evening hours. In the case of the loudest activity, a varsity football game, the sound from these games would be more noticeable at residences on a Friday evening (proposed condition) than they are Saturday afternoon (existing condition). This is primarily due to ambient noise (mostly traffic on roadways) decreasing during the evening hours.

However, noise from the project does not exceed this report's adopted threshold of significance which is based on County implementing program NO-1.c. Therefore, noise from the project is considered to have a less than significant noise impact.

3 Fundamental Concepts of Environmental Noise

Noise can be defined as unwanted sound. It is commonly measured with an instrument called a sound level meter. The sound level meter captures the sound with a microphone and converts it into a number called a sound level. Sound levels are expressed in units of decibels.

To correlate the microphone signal to a level that corresponds to the way humans perceive noise, the A-weighting filter is used. A-weighting de-emphasizes low-frequency and very high-frequency sound in a manner similar to human hearing. The use of A-weighting is required by most local General Plans as well as federal and state noise regulations (e.g. Caltrans, EPA, OSHA and HUD). The abbreviation dBA is often used to report the A-weighted sound level. Because of the time-varying nature of environmental sound, there are many descriptors that are

used to quantify the sound level. Although one individual descriptor alone does not fully describe a particular noise environment, taken together, they can more accurately represent the noise environment. The maximum instantaneous noise level (L_{max}) is often used to identify the loudness of a single event such as a car pass-by or airplane flyover.

To express the average noise level the L_{eq} (equivalent noise level) is used. The L_{eq} can be measured over any length of time but is typically reported for periods of 15 minutes to 1 hour. The background noise level (or residual noise level) is the sound level during the quietest moments. It is usually generated by steady sources such as distant freeway traffic. It can be quantified with a descriptor called the L_{90} which is the sound level exceeded 90 percent of the time.

There are other statistical descriptors that are used, often times as part of a local noise ordinance. These descriptors are used since local ordinances will have limits based on the number of minutes per hour that an intrusive sound may exceed a specified limit. For example, if a specified noise level cannot be exceeded more than 30 minutes in an hour that is referred to as the L_{50}. The L_{50} is also referred to as the median noise level.

To quantify the noise level over a 24-hour period, the Day/Night Average Sound Level (DNL or L_{dn}) or Community Noise Equivalent Level (CNEL) is used. These descriptors are averages like the L_{eq} except they include a 10 dB penalty during nighttime hours (and a 5 dB penalty during evening hours in the CNEL) to account for peoples' increased sensitivity during these hours. The CNEL and DNL are typically within one decibel of each other.

In environmental noise, a change in noise level of 3 dB is considered a barely noticeable difference. A 5 dB change is clearly noticeable, but not dramatic. A 10 dB change is perceived as a halving or doubling in loudness.

Examples of common noise sources and their corresponding noise levels are provided in the following table:

Sound Source	Sound Pressure Level (dBA)
Air raid siren at 50 ft (threshold of pain)[1]	120
Maximum levels in audience at rock concerts[1]	110
Train horn at 100 ft[3]	103
On platform by passing subway train[1]	100
On sidewalk by passing heavy truck or bus[1]	90
Commuter train traveling at 79 mph at 100 ft[3]	88
On sidewalk by passing automobiles[1]	70
Typical gas and electric powered leaf blower at 50 ft[2]	68 - 71
Conversational speech[4]	60
Typical urban area background/busy office[1]	60
Typical suburban area background[1]	50
Quiet suburban area at night[1]	40
Typical rural area at night[1]	30
Isolated broadcast studio[1]	20
Audiometric (hearing testing) booth[1]	10
Threshold of hearing[1]	0

[1]Cowan, James P. *Handbook of Environmental Acoustics*. Van Nostrand Reinhold, 1994.

[2]California Environmental Protection Agency, Air Resources Board. Mobile Source Control Division (2000). A report to the California legislature on the potential health and environmental impacts of leaf blowers. Retrieved from https://ww3.arb.ca.gov/msprog/leafblow/leafblow.htm

[3]California High-Speed Rail Authority. (2018). *How do High-Speed Train Noise Levels Compare to Traditional Trains. Retrieved from* https://www.hsr.ca.gov/communication/info_center/factsheets.aspx

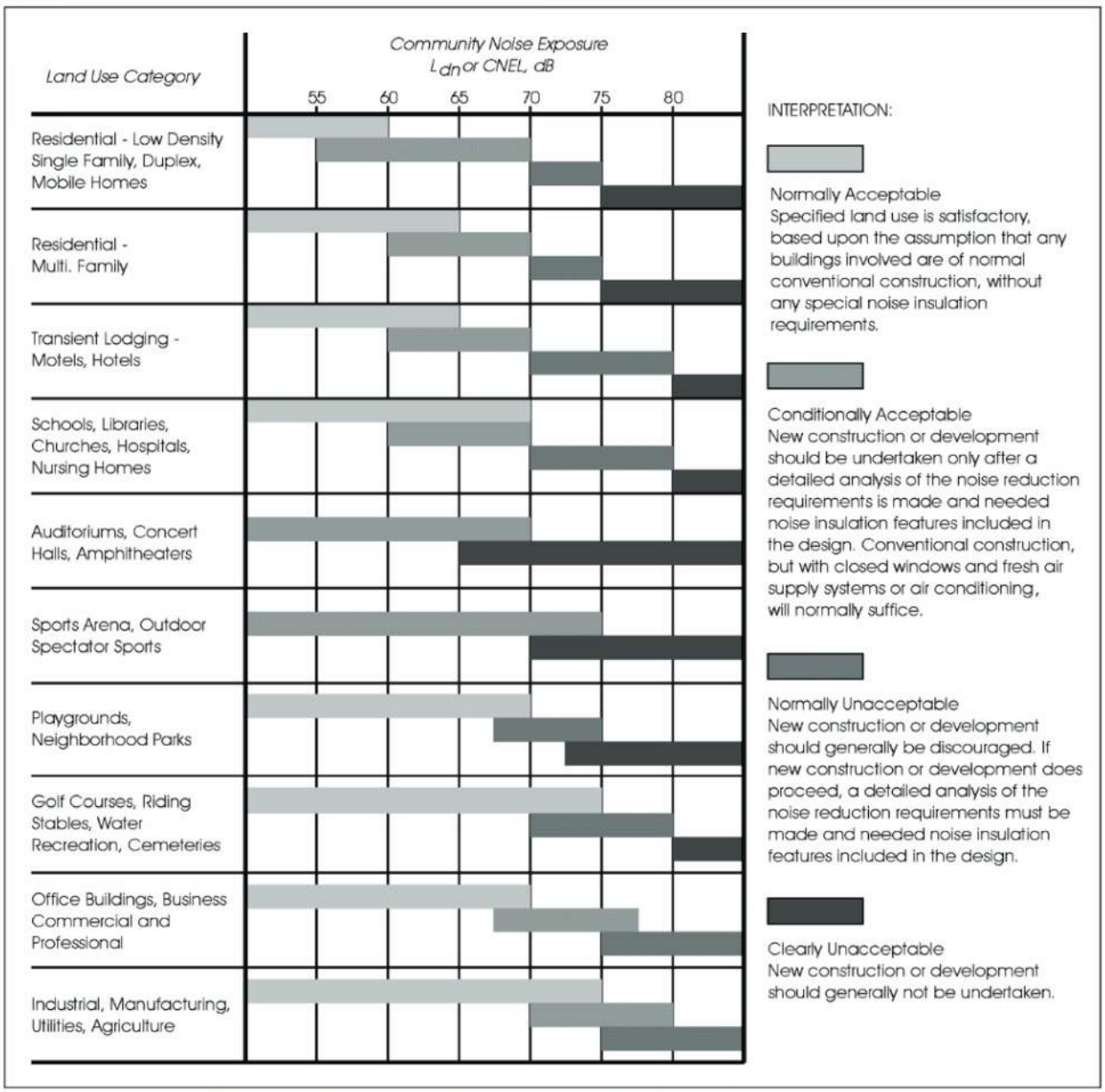
[4]Everest, Fredrick Alton, and Ken C. Pohlmann. *Master Handbook of Acoustics*, *5th Ed*. McGraw-Hill, 2009.

4 Acoustical Criteria

4.1 Local Noise Guidelines – Marin Countywide Plan

The high school property is in Kentfield which is an unincorporated area of Marin County. Applicable policies for assessing potential impact of noise from a project can be found in the Marin Countywide Plan. Figure 1 shows acceptable noise levels for a variety of activities and land uses that are promulgated by the State of California and included in the Marin Countywide Plan.

Figure 1: Acceptable Noise Levels [Countywide Plan Figure 3-41]



Source: California Office of Planning and Research, 1998 General Plan Guidelines.

Section 3.10 of the Marin Countywide Plan has goals, policies and implementing programs related to noise throughout the County. Some of these programs relate to the development of new projects while others relate to existing uses.

NO-1.a ***Enforce Allowable Noise Levels.*** Through CEQA and County discretionary review, require new development to comply with allowable noise levels.

The Acceptable Noise Levels in Figure 3-41 shall be used as a guide for determining the appropriate type of new development in relation to its ambient noise environment. Figure 3-41 applies primarily to proposed development exposed to transportation generated noise and to existing development exposed to increases in transportation generated noise due to proposed development. The standards in Figure 3-41 shall also be used to determine allowable noise levels for commercial, industrial, agricultural, or other less-noise-sensitive land uses exposed to stationery source noise generated by new development.

The Benchmarks for Allowable Noise Exposure from Stationary Noise Sources in Figure 3-43 shall be used as a guide for establishing allowable noise levels produced by stationary noise sources. These standards shall apply to new residential projects and other noise-sensitive land uses proposed near stationary noise sources. The standards shall also apply to new stationary noise-generating development proposed near existing residential or other noise-sensitive land uses.

It should be noted that the standards in Figures 3-41 and 3-43 are for purposes of planning and siting land uses. The standards are not a noise ordinance and are not to be used to achieve the same objectives as a noise ordinance. The standards are not to be used for regulating existing noise sources or enforcement concerning noise problems.

Figure 3-43 Benchmarks for Allowable Noise Exposure from Stationary Noise Sources

	Daytime (7 A.M. to 10 P.M.)	Nighttime (10 P.M. to 7 A.M.)
Hourly L_{eq}, dB	50	45
Maximum Level, dB	70	65
Maximum Level, dB (Impulsive Noise)	65	60

L_{eq} ("Equivalent Sound Pressure Level") is the constant sound energy that would produce the same noise level as actual sources that are fluctuating during the specified time period (one hour).

Guidelines for use of Figure 3-43:

1. The measurements are made at the property line of the receiving land use. The effectiveness of noise mitigation measures should be determined by applying the standards on the receptor side of noise barriers or other property line noise mitigation measures.
2. The nighttime standards apply only when the receiving land use operates or is occupied during nighttime hours.
3. Sound-level measurements to determine maximum level noise shall be made with "slow" meter response.
4. Sound-level measurements for impulsive noise sources shall be made with "fast" meter response. Impulsive noises are defined as those that have sharp, loud peaks in decibel levels but that quickly disappear. Examples include a dog's bark, a hammer's bang, and noise with speech or music content.
5. The allowable noise level standard shall be raised to the ambient noise level in areas where the ambient level already exceeds the standards shown in this table. For example, if the neighborhood already experiences daytime hourly noise levels of 60 dBA as an ambient condition, the noise level standard shall be raised to 60 dBA.
6. The allowable noise level shall be reduced 5 dB if the ambient hourly Leq is at least 10 dB lower than the noise-level standard shown in this table. For example, if the neighborhood experiences daytime hourly noise levels of 40 dBA as an ambient condition, the noise level standard shall be lowered to 45 dBA.

NO-1.b ***Comply with Acceptable Noise Levels.*** Require discretionary permits for residential and other noise-sensitive land uses proposed near noise sources that may exceed acceptable noise levels and/or benchmarks to provide acoustical analyses; and, if necessary, commit to measures to comply with the applicable standards set out in Program NO-1.a. Amend the Development Code to include these requirements.

NO-1.c ***Require Project-Specific Noise Mitigation.*** Require all development to mitigate its noise impacts where the project would

- raise the Ldn by more than 5 dBA;
- raise the Ldn by more than 3 dBA and exceed the Normally Acceptable standard; or
- raise the Ldn by more than 3 dBA and the Normally Acceptable standard is already exceeded.

In 2013, the Marin County Planning Commission (Resolution PC13-001[1]) denied an appeal of the County's approval of the MCHS bleacher and PA system replacement project. In their denial, the County delineated the section of the Countywide Plan (CWP) that could be interpreted to apply to sports facility related projects at MCHS. As a result, implementing programs NO-1.a and NO-1.b are not used as thresholds of significance in this report per the resolution's adopted finding, including section VII. B. which states:

> *The appellant [Holzwarth] misinterprets the Countywide Plan (CWP) policies and programs regarding noise impacts. CWP Noise element program NO-1.a refers to figures 3-41 and 3-43. Figure 3-41 provides information on various "Acceptable Noise Levels", and Figure 3-43 provides "Benchmarks for Allowable Noise Exposure from Stationary Noise Sources" including a maximum level from 7 am until 10 pm of 70 decibels (65 decibels for impulsive noise). However, Program NO-1.a states: "The standards are not a noise ordinance. The standards are not to be used for regulating existing noise sources or enforcement concerning noise problems." Marin Catholic's sports facility is a source of noise that has existed in the community for decades. CWP program NO-1.b states, in relevant part: "Require discretionary permits for residential and other noise sensitive land uses proposed near noise sources that may exceed acceptable levels and/or benchmarks to provide acoustical analysis; and, if necessary, commit to measures to comply with the applicable standards set out in NO-1.a." The County interprets these programs to work together to require that the development of new housing near noisy areas such as highways and rail lines should incorporate measures to protect the new residents from excessive noise levels.*
>
> *CWP program NO-1.c, which indicates that all new development should mitigate its noise impacts only when it increases noise by 5 decibels (or by 3 decibels when the acceptable decibel levels are exceeded), is the program that could be interpreted to apply to the proposed project.*

Accordingly, this report uses CWP program NO-1.c as a basis for the thresholds of significance used to identify potential noise impacts resulting from implementation of the proposed project (see section 3.3).

[1] Marin County Planning Commission, Resolution PC13-001, Resolution Denying the Holzwarth Appeal and Sustaining the Community Development Agency's Conditional Approval of the SF Archdiocese/Marin Catholic High School Design Review. 22 April 2013

4.2 CEQA Guidelines

In accordance with Section XIII of Appendix G of the *CEQA Guidelines*, a proposed project could have a significant environmental impact if it would result in:

a. *Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.*

b. *Generation of excessive groundborne vibration or groundborne noise levels.*

c. *For a project located within the vicinity of a private airstrip or 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*

4.3 Threshold of Significance

This report evaluates the potential significance of a noise impact using checklist item (a) of the CEQA Guidelines (see Section 3.2 of this report). The CEQA checklist does not specify a quantitative method for determining whether or not a project would cause a potentially significant impact. Therefore, for the purposed of assessing impact due to the proposed project, this report uses a threshold based on implementing measure NO-1.c from the Marin Countywide Plan as follows:

The project will cause a significant adverse noise impact if it will:

- raise the CNEL by more than 5 dBA,
- raise the CNEL by more than 3 dBA and exceed the Normally Acceptable standard; OR
- raise the CNEL by more than 3 dBA and the Normally Acceptable standard is already exceeded.

Since the project will allow for evening activities (between 7 pm and 10 pm), the analysis in this report uses CNEL in lieu of L_{dn} (which is used in Policy NO-1.c of the Countywide General Plan) The CNEL includes a penalty to account for peoples increases sensitivity to sounds during evening hours which is not included in the calculation of L_{dn}. Therefore, use of CNEL in lieu of L_{dn} results in a more conservative assessment of noise impact since the L_{dn} would tend to show a lower increase in noise as compared to use of CNEL.

5 Existing Noise Environment

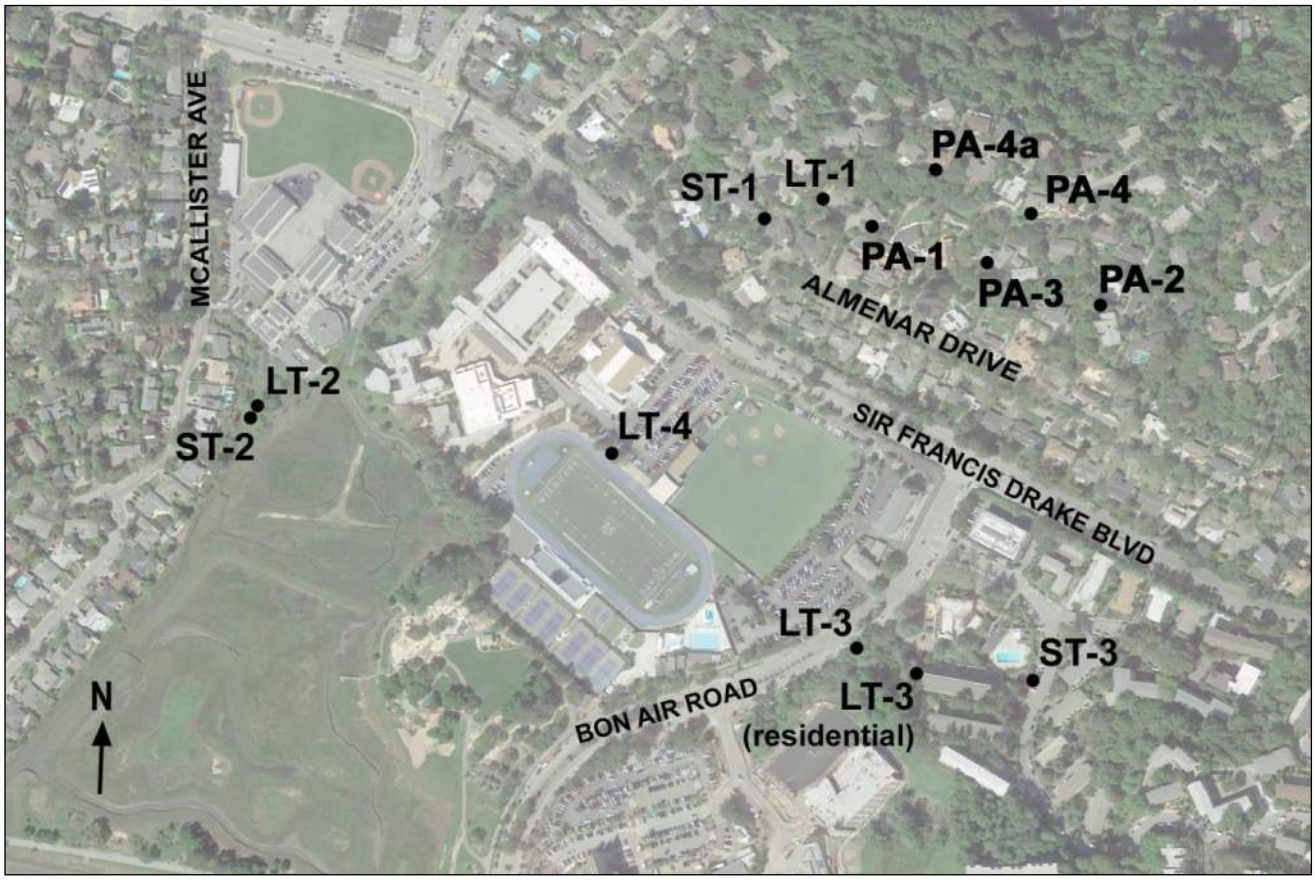
There are three areas of residential land use that are potentially affected by sounds from the project: the single-family homes to the north on the hillside across Sir Francis Drake Boulevard, the single-family homes to the west along McAllister Avenue (across the wetlands), and the multi-family residences to the east across Bon Air Road.

The sounds from Dino Ghilotti Motta Stadium are primarily the result of athletic games and practices including football, men's and women's soccer, lacrosse and track & field. Team practices generate lower sound levels than a game but occur more frequently. The surrounding area is exposed to other ambient noise sources such as traffic on roadways (e.g. Sir Francis Drake Boulevard and Bon Air Road), residential activity (home/landscape maintenance and voices), sirens from public safety vehicles (e.g. Marin General Hospital), birds and occasional aircraft flyovers.

5.1 Ambient Noise Measurements

To quantify existing noise levels at adjacent noise sensitive land uses, three sets of sound measurements were performed. Figure 2 shows the locations of the measurements.

Figure 2: Noise Measurement and Receiver Locations



Measurements During Football Games: October 11, 2014 and October 18, 2014:

Short-term sound measurements were made at residences across Sir Francis Drake Blvd. during two Saturday football games. These measurements were originally conducted to assess conformance of the public address (PA) system with the project conditions of approval. The results of these measurements are shown in Tables 1.

Table 1: Noise Measurement Results from Varsity Football Games 11 and 18 October 2014

Location/ Address	A-weighted Sound Level, dBA				
	L_{eq}	L_{90}	PA System*		Notes/L_{max} (slow)
			L_{max} (fast)	L_{max} (slow)	
PA-1 15 Almenar Drive	55	52	55-59	52-55	crowd 55-63 whistle 52-55 traffic 50-55
PA-2 130 Corte Balboa	51	48	49-56	51-54	crowd 55-61 whistle 48-51 traffic 48-57
PA-3 100 Corte Elena	57	53	50-55	53-55	crowd 59-63, hourly chimes 65-69 construction 58 traffic 55-58
PA-4 190 Vista Grande	51	48	52-53	49-50	whistle 50 traffic 48-53
PA-4a 172 Vista Grande	55	52	56-58	53-56	construction 54-59 traffic 52-58

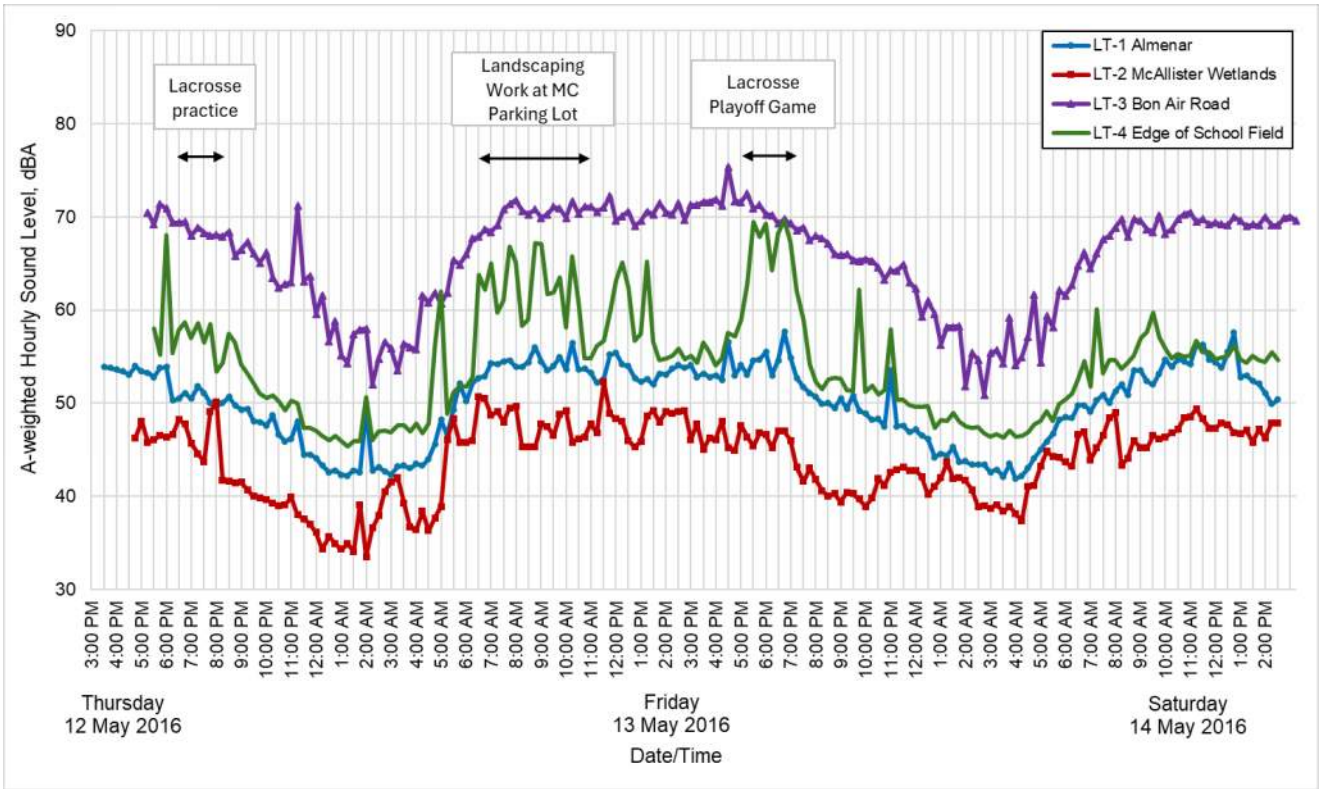
NOTE: Photographs of the bleachers that were made during the football games indicate that there was an average of 200 spectators. The photographs did not clearly indicate the number of other participants but according to the project description, there were also approximately 90 additional individuals which included players, cheerleaders and staff.

Measurements of Ambient Noise: May 12 - May 14, 2016 and February 22 - February 25, 2024:

In 2016, long-term noise measurements were made at the three residential areas near the stadium to quantify ambient noise levels when school is in session. The measurement period included a boys' varsity lacrosse playoff game on Friday, May 13, 2016. Figure 1 shows the location of the noise measurements.

A fourth long-term measurement (LT-4) was made at the edge of the stadium, relatively close to the athletic field. This location was chosen to help quantify sounds from field activities with less influence of other ambient noise sources. The 2016 long-term noise measurement results are shown in Figure 3.

Figure 3: 2016 Long-term Hourly Noise Measurement Results



Short-term noise measurements were made during the playoff lacrosse game in 2016 to allow for direct observation of the activity and to help determine sound levels at other locations in the community. The results of the short-term noise measurements are shown in Table 2.

Table 2: Short-Term Noise Measurement Results during Lacrosse Game, 13 May 2016

Site	Location	Time	L_{eq}	L_{max}
ST-1	On public stairway above end of Almenar Drive	5:37 – 5:42 pm	53	Crowd: 57 – 65 Whistles: 54 Traffic: 50 - 53
ST-2	Open space behind homes along McAllister.	6:23 – 6:43 pm	44	Crowd: 47 - 51 PA Announcements: 54 - 59 Whistle: 42 Distant traffic/birds: 41 Children in playground: 52
ST-3	Sidewalk of Via Hidalgo near Apartments	6:01 – 6:16 pm	56	Crowd: 54 – 62 Local cars: 70 Distant traffic: 55 Birds: 55 – 60 Whistle: 53 PA: 51 (barely audible over traffic)

In February 2024, additional ambient noise measurements were performed at long-term measurement locations LT-2 and LT-3 to quantify any change in ambient noise levels since 2016. Similar to 2016, a long-term measurement (LT-4) was also made at the edge of the stadium. Figure 4 shows the 2024 long-term noise measurement results.

Figure 4: 2024 Long-term Hourly Noise Measurement Results

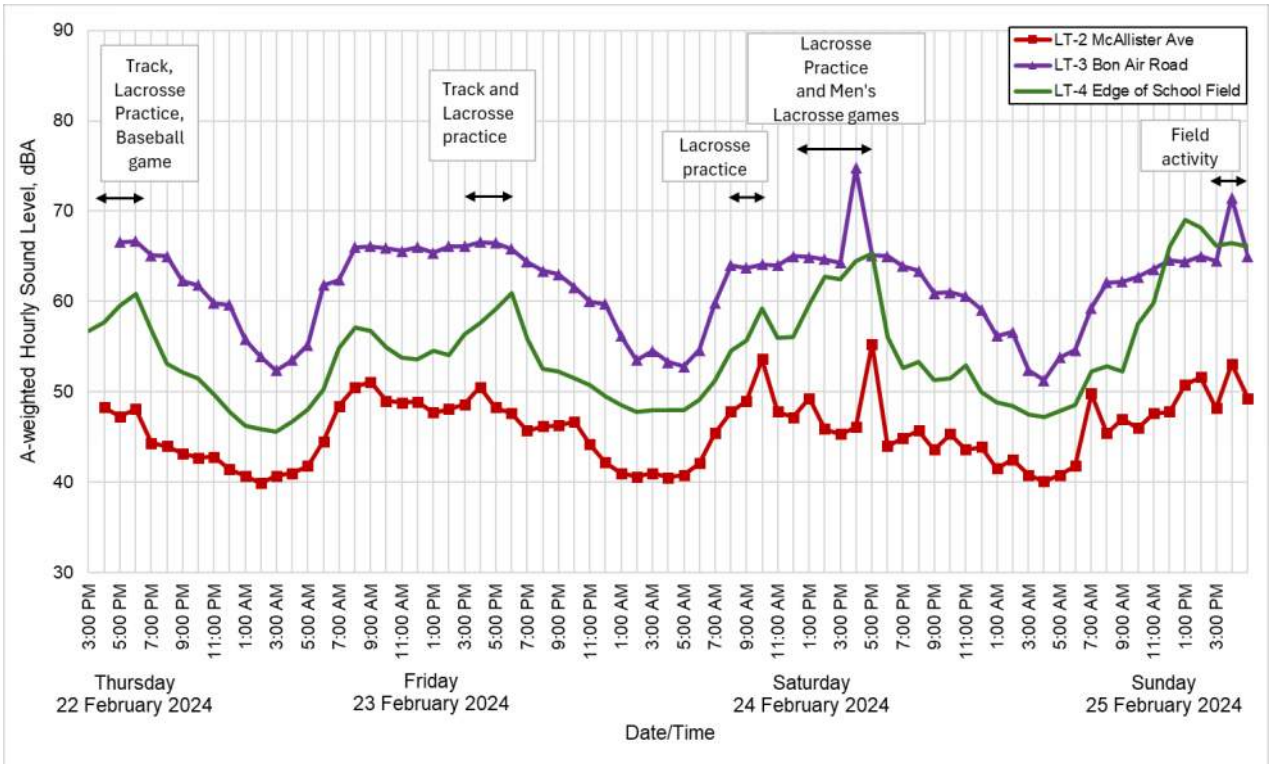


Table 3 shows the CNEL at each of the long-term noise monitoring locations. The CNEL is calculated using measured noise levels during weekdays. To quantify the ambient noise level for comparison with stadium generated sounds, the contribution of sounds from stadium related activities that occurred during the ambient measurements is excluded from the calculation of the ambient CNEL. Minor adjustments are also made to the measured noise levels at location LT-1 to exclude the noise contribution of landscaping work that occurred near the Marin Catholic parking lot.

Table 3: Ambient Noise Levels at Receiver Areas

Receiver	Noise Level, dBA				
	CNEL		L_{eq}		
	2016	2024	Time of Day*	2016	2024
LT-1 Almenar Drive	55	Not measured	Day	53	Not measured
			Evening	50	Not measured
LT-2 McAllister Avenue	50	51	Day	48	49
			Evening	42	43
LT-3 (residential) Bon Air Road	66	61	Day	65	60
			Evening	61	56

* Day: 7am-7pm, Evening: 8:30pm-9:30pm

The measurement at LT-3 was made close to Bon Air Rd. However, the nearest residential building is located farther from the roadway at Location LT-3 (residential). The noise level shown for LT-3 (residential) includes an adjustment factor to account for the added distance from the roadway. Short-term ambient noise levels are also shown in Table 3. They are separated into daytime when most activities currently occur at the stadium and the evening when some games and practices would occur with the project.

A comparison of the 2024 noise measurements with the 2016 noise measurements show that there is an approximately 1 dBA increase in noise at LT-2 and approximately 5 dBA decrease in noise at LT-3. We reviewed photos that were taken in 2016 and they show that the surface of Bon Air Road was rougher with more cracks than now (2024). This is likely the main reason why ambient noise levels were higher in 2016.

Measurements of Sound Levels During Practices: April 28, 2016 - May 2, 2016:

The long-term noise measurement that was made at the edge of the stadium (LT-4) was used to help quantify sounds from various team practices.

5.2 Discussion of Receiver Areas

Single-family homes to the north

The homes to the north across Sir Francis Drake Blvd. are generally on the side of a hill and elevated above (overlooking) Marin Catholic High School. Noise measurements were conducted at homes that are "set-back" from (i.e. not adjacent to) Sir Francis Drake Blvd. At these homes, sounds from the stadium is more readily measurable since the noise from traffic on Sir Francis Drake Blvd is attenuated by the added distance to the roadway.

Location LT-1 was at the edge of an elevated deck and represents the noise exposure of the upper floors of homes that have exposure to the stadium sounds and are not shielded from the stadium sounds by intervening terrain or structures. Locations PA-1 through PA-5 were at various homes in this area that agreed to participate in the PA system sound study in 2014. Location ST-1 was along a public stairway. In general, sounds from the Stadium are audible at times but tend to mix in with traffic noise. During football games, the sound from the crowd cheering tends to be louder than sound from the PA system. Sound from people shouting on the field and whistles are also audible in this area.

Single family homes to the west

The homes along McAllister Avenue are separated from Marin Catholic High School by the Corte Madera Creek wetlands. Location LT-2 was on a tree near the backyards of the homes. The ambient noise levels in this area are lower since there is no adjacent roadway and traffic noise from Sir Francis Drake Blvd. is attenuated by intervening buildings. Since the Stadium is elevated above the wetlands and residences, the sound from people on the field is reduced by acoustical shielding from the Stadium structure and terrain. During the Lacrosse game measurements, the sound of the PA was generally louder than the sound of the crowd cheering.

Multi-family residences to the east across Bon Air Road

The residences closest to the Stadium are across Bon Air Road on the west side of Via Hidalgo. Location LT-3 was on a tree about 45 feet from the centerline of Bon Air Road and the measured noise levels are generally dominated by traffic on Bon Air Road. Location ST-3 was on the sidewalk of Via Hidalgo and represents a residential location father from Bon Air Road. The sound of the crowd during the Lacrosse game was noticeable but the sound of the PA system tended to be drowned out ("masked") by traffic noise.

6 Project Generated Sound and Potential Impacts

6.1 Summary of Athletic Field Use with Project

Installation of lights will allow the school to use the athletic field during evening hours for both games and practices. Table 4 summarizes those activities that would occur under lights.

Table 4: Use of Motta Stadium with Proposed Lights

Sport	Team	Existing			with Project		
		Number of Games	Game Time	# of Spectators	Number of Games	Game Time	# of Spectators
Football Game	Varsity	5	2:00pm-4:00pm	300-1300	5	7pm-9:30pm	500-1514
	Playoff	up to 4	2:00pm-4:00pm	300-1300	up to 4	7pm-9:30pm	500-1514
	JV	5	11:30pm-1:30pm	< 300	5	4:00pm-6:00pm	< 300
	Freshmen	5	9:30am-11:30am	< 300	5	4:00pm-6:00pm	< 300
Soccer Game	Boys' Varsity	12	3:00pm-5:00pm	< 100	12	4:00pm-6:00pm	< 150
	Boys Varsity Playoff	up to 10	3:00pm-5:00pm	< 100	up to 10	6:00pm-8:00pm	< 150
	Boys JV	12	3:00pm-5:00pm	< 100	12	6:00pm-8:00pm	< 150
	Girls' Varsity	12	3:00pm-5:00pm	< 100	12	6:00pm-8:00pm	< 150
	Girls Playoff	up to 10	3:00pm-5:00pm	< 100	up to 10	6:00pm-8:00pm	< 150
	Girls' JV	12	3:00pm-5:00pm	< 100	12	6:00pm-8:00pm	< 150
Lacrosse Game	Boys' Varsity	10	4:00pm-5:30pm	< 100	10	6:30pm-8:00pm	< 150
	Boys' Playoff	up to 7	5:00pm-6:30pm	< 100	up to 7	6:00pm-7:30pm	< 150
	Boys' JV	10	5:30pm-7:00pm	< 100	10	5:00pm-6:30pm	< 150
	Girls' Varsity	10	4:00pm-5:30pm	< 100	10	6:30pm-8:00pm	< 150
	Girls' Varsity Playoff	up to 7	5:00pm-6:30pm	< 100	up to 7	6:00pm-7:30pm	< 150
	Girls' JV	10	5:30pm-7:00pm	< 100	10	5:00pm-6:30pm	< 150

Sport	Team	Existing			with Project		
		Number of Games	Game Time	# of Spectators	Number of Games	Game Time	# of Spectators
Track & Field Meet	Coed	2	3:00pm-7:00pm	< 100	2	3:00pm-7:00pm	< 100

Existing practices:

August - October: 4:00-6:00pm (2 teams share)
November: 3:00-5:00pm (5 teams share)
December - January: 3:00-5:00pm (4 teams share)
February: 3:00-5:00pm (7 teams share)
March - June: 3:00-5:00pm (3 teams share); 5:00-7:00pm (2 teams share)

Project practices (with artificial lights) has same number as existing but divided as follows:

August - October: 4:00-6:00pm (2 teams share)
November: 3:00-5:00pm (2 teams share); 5:00-7:00pm (2 teams share); 7:00-9:00pm (1 team)
December - January: 3:00-5:00pm (2 teams share); 5:00-7:00pm (2 teams share)
February: 3:00-5:00pm (3 teams share); 5:00-7:00pm (2 teams share); 7:00-9:00pm (2 teams share)
March - June: 3:00-5:00pm (3 teams share); 5:00-7:00pm (2 teams share)

6.2 Impact of Operational Noise (Athletic Field and Traffic)

6.2.1 Methodology for Determining Project Sound Levels

Football games

This analysis uses noise measurements conducted in the residential area to the north of the stadium, across Sir Francis Drake Blvd, during a football game. Since the measured sound levels included ambient traffic noise, the L_{eq} of the football game was determined by mathematically removing the contribution from traffic noise (which was conservatively assumed to be the L_{90}, or background noise). The L_{eq} of the football game was then adjusted based on attendance. Specifically, the sound level during the games was adjusted using a rate of 3 dBA per doubling in attendance.

There are currently up to 1,300 spectators at a highly attended football game. With the project, the number of spectators at a highly attended football game is expected to increase to 1,514. There are approximately 90 players, coaches and officials during a football game. This increase in attendance corresponds to a 0.6 dBA increase in the L_{eq} during a high attendance game. The junior varsity games have an attendance of 359 which is not expected to increase with the project.

Men's and Women's Lacrosse, Soccer, and Track meets

Sound levels measured from a lacrosse playoff game are used as a basis for calculating sound level from games such as men's and women's lacrosse, soccer and track meets at the stadium. The lacrosse game had approximately 162 spectators based on photographs during the game. The PA was used for announcements at the beginning, halftime and end, but not for play-by-play commentary.

Practices

The sound level from a series of lacrosse practices were measured at Location LT-4 over the course of several days in 2016. Practice sounds is generally limited to the voices of coaches and players as well as the coaches' whistles. Currently, up to seven school sports teams share the field at the same time. With the project, some practices would start and end later, resulting in less people using the field simultaneously. The number of practices with and without the project would remain the same.

Traffic and parking lot

Noise from parking lot use and increased traffic are based on the traffic volumes provided by the project's traffic analysis (Parametrix, 2024). According to the analysis, traffic volumes during the hour before a highly attended varsity football game (and post JV football game) are expected to be up to 572 along Sir Francis Drake Blvd and up to 368 along Bon Air Road. Traffic volumes during the hour after a varsity football game are expected to be less, with up to 493 trips along Sir Francis Drake Blvd and 350 trips along Bon Air Road.

Parking lot noise was calculated using SoundPLAN, a noise prediction computer model. Noise from traffic on Sir Francis Drake Blvd. and Bon Air Road was calculated using existing and project traffic volumes with consideration of ambient traffic noise levels during the evening games. Since the noise measurement at LT-1 was from 2016, the 2016 traffic counts from a 2016 traffic study (Omni-Means) were used instead of the more recent traffic study (Parametrix, 2024).

Atmospheric considerations

Atmospheric effects such as wind and temperature gradients (variation in wind speed and temperature with elevation above ground), and molecular absorption (sound energy absorbed by air molecules) can affect sound propagation. Data on the effect of molecular absorption on sound propagation are readily available while data on the effect of wind and temperature gradients are variable and difficult to reliably predict.

Published data for molecular absorption was reviewed to help identify the potential differences between sound propagation during daytime hours when football games are currently played and evening hours when games would be played with the project. Since the evenings tend to have lower temperatures and higher humidity, the molecular absorption would be less in the evenings and therefore, result in slightly higher sound levels at distant receivers.

The calculated difference in molecular absorption between daytime and evening hours is 0.3 dBA for receivers that are 1,000 feet from the stadium. This results in a negligible change (0.2 dBA or less) in the increase in noise when accounting for ambient noise.

6.2.2 Sound Modeling Results

Residential Receivers

Table 5 presents the sound levels generated by the various stadium activities in terms of the average sound level (L_{eq}) and were used to calculate the L_{dn} and CNEL for comparison with the noise impact threshold of significance.

Table 5: Stadium Activities Sound Levels

	Stadium Activity Sound, L_{eq} (dBA)	
	Existing	Proposed
LT-1 Almenar Drive		
Varsity Football Game	60	60
JV/Freshman Football	54	54
Other Games	51	52
Football practice	48	48
Other practice	45	45
LT-2 McAllister Avenue		
Varsity Football Game	52	53
JV/Freshman Football	48	48
Other Games	42	43
Football practice	37	37
Other practice	34	34
LT-3 (residential) Bon Air Road		
Varsity Football Game	61	62
JV/Freshman Football	56	56
Other Games	53	54
Football practice	50	50
Other practice	47	47

Table 6 shows the change in CNEL resulting from the project during football games with maximum attendance. The CNEL includes the sound of stadium activities, parking lot use and roadway traffic before and after the football games. The total CNEL is calculated for both the existing and project conditions to determine the increase in CNEL due to the project for the purposes of assessing impact.

Location LT-1 is used to represent the larger residential area north of Sir Francis Drake Boulevard. According to Table 6, the increase in CNEL is 2.4 dBA at LT-1. At other locations in the residential area north of Sir Francis Drake Blvd., the ambient noise and football game sounds will vary depending on distance to the sound sources. For example, at locations closer to Sir Francis Drake Boulevard than LT-1, both football game sounds and ambient noise will tend to be higher than at LT-1. At locations farther from the roadway, the football and ambient sound levels will tend to be lower than at LT-1. The change in CNEL due to the project in the

residential areas surrounding LT-1 would be generally consistent with the change in CNEL calculated for LT-1.

For example, noise modeling indicates that homes adjacent to Sir Francis Drake Boulevard would experience an increase in CNEL with the project of 1.7 dBA. The increase in CNEL is less than at LT-1 because the ambient traffic noise increases more than the football game noise. At homes near the top of the hillside (higher elevation), the CNEL would increase up to 2.8 dBA. The increase in CNEL at this location is slightly greater than at LT-1 because the difference between football game sounds and ambient noise is greater than at LT-1. In both of these examples, the increase in CNEL is within 1 dBA of the increase of 2.4 dBA predicted for LT-1 shown in Table 6 and would not change the impact findings in Section 5.2.3.

Table 6: Change in CNEL for a Day with Maximum Attendance
Varsity and Junior Varsity Football Games

Receiver Area	Source	Football Game Day CNEL (dBA)		
		Existing	Proposed	Increase
LT-1 Almenar Drive	Ambient	54.9	54.9	
	Football Games	49.9	55.9	
	Total	56.1	58.4	2.4
LT-2 McAllister Avenue	Ambient	51.4	51.4	
	Football Games	42.7	48.7	
	Total	51.9	53.3	1.3
LT-3 (residential) Bon Air Road	Ambient	61.2	61.2	
	Football Games	51.6	58.5	
	Total	61.7	63.1	1.4

In order to understand the effect of sounds from other stadium activities throughout the year, it is helpful to consider sound levels on an annual basis. The annual average CNEL is the average of sound levels over 12 months. The annual average CNEL considers both the sound level of the events and the number of events per year. Table 7 shows the annual average CNEL for stadium activities which includes football games, men's and women's soccer and lacrosse games, practices, and game-related traffic and parking. It also accounts for the rescheduling of activities to the evening hours.

Table 7: Change in Annual Average CNEL

Residential Receiver Area	Source	Annual Average CNEL (dBA)		
		Existing	Proposed	Increase
LT-1 Almenar Drive	Ambient	54.9	54.9	
	Stadium Activities	39.0	43.4	
	Total	55.0	55.2	0.2
LT-2 McAllister Avenue	Ambient	51.4	51.4	
	Stadium Activities	30.3	35.2	
	Total	51.4	51.5	0.1
LT-3 (residential) Bon Air Road	Ambient	61.2	61.2	
	Stadium Activities	40.7	45.6	
	Total	61.2	61.3	0.1

For additional information, see Appendix A.

Change in Noticeability at Residential Receivers

Table 5 can be used to help the reader understand any change in the 'noticeability" of the field activities (e.g. football games) at nearby residences under the proposed project. One way to quantify the change in noticeability is to compare the difference between the sound level of a game and the sound level that is present when no games are being played (ambient). The following discussion is intended to explain how the noticeability of a football game changes with the proposed project.

Along Almenar Drive, the sound level from a highly attended football game is calculated to be an L_{eq} of 60 dBA in the existing condition while the ambient noise level is L_{eq} 53 dBA during the day (see Table 3). This means that the sound level from the football game is about 7 dBA greater than the ambient noise level. In the future, with an expected increase in attendance, the L_{eq} from a football game would increase by less than a decibel on Friday evening while the ambient noise decreases to L_{eq} 50 dBA, primarily due to a decrease in traffic on roadways. This means that the sound level from a highly attended football game would be 10 dBA above the ambient. A change from 7 dBA above the ambient under existing conditions to 10 dBA above the ambient with the project would be just noticeable and therefore, sounds from evening football games would be slightly more noticeable with the project (evening games) than during a Saturday afternoon football game under the existing conditions.

Along McAllister Avenue, the sound level from a highly attended football game is calculated to be an L_{eq} of 52 dBA in the existing condition and an L_{eq} of 53 dBA in the future with an expected increase in attendance. Since the ambient is L_{eq} 49 dBA during the day and L_{eq} 43 dBA during the evening, the sound level difference between the high attendance football game and ambient increases from 3 dBA in existing conditions to 10 dBA with the project. This means football game sounds would be clearly more noticeable at the homes along McAllister Ave.

Along Bon Air Road, the sound level from a highly attended football game is calculated to be an L_{eq} of 61 dBA in the existing condition and an L_{eq} of 62 dBA in the future with an expected increase in attendance. Since the ambient is L_{eq} 60 dBA during the day and L_{eq} 57 dBA during the evening, the sound level difference between the high attendance football game and ambient increases from 1 dBA in existing conditions to 5 dBA with the project. This means football game sounds would be clearly more noticeable at the homes along Bon Air Road.

Wetlands at Corte Madera Creek

At the wetlands, the sound level from a highly attended football game is calculated to be an L_{eq} of 58 dBA in the existing and future conditions. In the wetlands area, the voices from people in the crowd and the field are reduced by the acoustical shielding provided by the terrain and the grandstands. The PA system sound represents a greater contribution to the overall noise levels. The average noise level during PA announcements is calculated to be L_{eq} 59 dBA and the typical maximum noise level from the PA would be L_{max} 65 dBA.

Football games are currently played during the daytime on Saturdays. The ambient noise level at the wetland area during the daytime on Saturday is L_{eq} 45 to 49 dBA when there is no football game. With the project, the football games will be played in the evening between 7:00 p.m. and 9:30 p.m. The ambient hourly L_{eq} at the wetland on weekdays during this time currently varies from 43 dBA to 46 dBA, with the higher ambient occurring during the earlier hours and decreasing the time gets later. [see wildlife report by others for impact analysis]

6.2.3 Noise Impact Assessment Findings

Table 8 summarizes the change in CNEL due to the project and compares it with the applicable threshold of significance. In order to determine whether or not the change is considered significant one must consider the extent of the change and whether or not the community is exposed to noise levels that currently exceed or would exceed a CNEL that is considered "Normally Acceptable". According to Figure 1, a CNEL of 60 dBA or less is considered "Normally Acceptable for residential land uses.

At locations LT-1 and LT-2, the existing and future (proposed) CNEL ranges from 51.4 dBA to 58.4 dBA (see Table 6). This means that the community noise exposure does not exceed "normally acceptable" noise levels and the threshold for a significant increase is 5 dBA. As summarized in Table 8, LT-1 and LT-2 would experience an increase of 0.1 to 2.4 dBA on a daily and annual CNEL basis. This increase is less than 5 dBA and therefore, noise from the proposed project is considered a less than significant impact.

At location LT-3 (residential) the existing and future CNEL ranges from 61.2 to 63.1 dBA and this exceeds the community noise exposure that is considered "Normally Acceptable". Accordingly, the threshold for a significant increase is 3 dBA. As summarized in Table 8, LT-3 (residential) would experience an increase of 1.4 dBA or less on a daily and annual CNEL basis. This increase is less than 3 dBA and therefore, noise from the proposed project is considered a less than significant impact.

Table 8: Change in CNEL Due to Project

Receiver		Increase in CNEL, dBA	CNEL exceeds "Normally Acceptable" Y/N	Threshold of Significance (increase in CNEL, dBA)	Exceeds Threshold of Significance (Y/N)
LT-1 Almenar Drive	Football Game Day	2.4	N	5	N
	Annual Average	0.2		5	N
LT-2 McAllister Avenue	Football Game Day	1.3	N	5	N
	Annual Average	0.1		5	N
LT-3 (residential) Bon Air Road	Football Game Day	1.4	Y	3	N
	Annual Average	0.1		3	N

* * *

Appendix A:
Existing and Future Noise Levels

Table A-1: CNEL Contributions for Proposed Project Related Sources

Receiver	Source	CNEL (dBA) Football Game Day	Annual CNEL (dBA)
LT-1 Almenar Drive	Stadium Sounds	55.8	43.2
	Game Traffic	38.6	27.7
	Parking Lot	36.5	25.8
	Total	55.9	43.4
LT-2 McAllister Avenue	Stadium Sounds	48.2	34.8
	Game Traffic	38.8	23.5
	Parking Lot	30.2	17.9
	Total	48.7	35.2
LT-3 (residential) Bon Air Road	Stadium Sounds	57.5	44.9
	Game Traffic	51.7	36.7
	Parking Lot	37.8	26.2
	Total	58.5	45.6

Table A-2: L_{dn} Contributions for Proposed Project Related Sources

Receiver	Source	L_{dn} (dBA) Football Game Day	Annual L_{dn} (dBA)
LT-1 Almenar Drive	Stadium Sounds	51.4	40.2
	Game Traffic	38.0	25.5
	Parking Lot	31.0	22.1
	Total	51.6	40.5
LT-2 McAllister Avenue	Stadium Sounds	44.0	31.5
	Game Traffic	38.1	22.4
	Parking Lot	24.1	13.8
	Total	45.1	32.1
LT-3 (residential) Bon Air Road	Stadium Sounds	53.1	41.9
	Game Traffic	51.0	35.6
	Parking Lot	32.0	22.2
	Total	55.2	42.9

Table A-3: Change in Daily L_{dn} from a Maximum Attendance Varsity and JV Football Games

Receiver	Source	Football Game Day L_{dn} (dBA)		
		Existing	Proposed	Increase
LT-1 Almenar Drive	Ambient	54.5	54.5	
	Football Games	49.9	51.6	
	Total	55.8	56.3	0.5
LT-2 McAllister Avenue	Ambient	51.4	51.4	
	Football Games	42.7	45.1	
	Total	51.9	52.3	0.4
LT-3 (residential) Bon Air Road	Ambient	61.2	61.2	
	Football Games	51.6	55.2	
	Total	61.7	62.2	0.5

Table A-4: Change in Annual Average L_{dn}

Receiver	Source	Annual Average L_{dn} (dBA)		
		Existing	Proposed	Increase
LT-1 Almenar Drive	Ambient	54.5	54.5	
	Stadium Activities	39.0	40.5	
	Total	54.6	54.6	< 0.1
LT-2 McAllister Avenue	Ambient	51.0	51.0	
	Stadium Activities	30.3	32.1	
	Total	51.0	51.0	< 0.1
LT-3 (residential) Bon Air Road	Ambient	60.8	60.8	
	Stadium Activities	40.7	42.9	
	Total	60.8	60.8	< 0.1