4.7 NOISE

4.7.1 Environmental Setting

This section describes the existing noise environment in and around site of The Village at Loomis (proposed project) and identifies noise levels expected to be generated by construction and operation of the proposed project. Receptors that may potentially be affected by noise are identified, and the criteria used to evaluate the effect of project-generated noise upon the existing noise environment. The discussion also describes the fundamentals of acoustics, the results of a site reconnaissance, sound level measurements, acoustical calculations, and assessment of potential noise impacts from construction and project operation.

One comment regarding noise was received in response to the Notice of Preparation from a resident in the area. The letter requests that a sound wall be constructed on the freeway side of the project site to reduce freeway noise to new and existing residences. The Notice of Preparation and comments received in response to that document are provided in Appendix A of this draft environmental impact report (EIR).

The information used to prepare this analysis is based on the Environmental Noise Analysis prepared for the project by Bollard Acoustical Consultants, which is provided in Appendix F of this draft EIR.

Characteristics of Environmental Noise

Fundamentals of Acoustics

Noise is generally defined as loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities. Although exposure to high noise levels over an extended period has been demonstrated to cause hearing loss, the principal human response to noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise, its appropriateness in the setting, the time of day, the type of activity during which the noise occurs, and the sensitivity of the individual.

Sound is a physical phenomenon consisting of minute vibrations that travel through a medium, such as air, and are sensed by the human ear. Sound is generally characterized by a number of variables including frequency and intensity. Frequency describes the sound's pitch and is measured in Hertz (Hz), while intensity describes the sound's loudness and is measured in decibels (dB). Decibels are measured using a logarithmic scale. A sound level of 0 dB is approximately the threshold of human hearing and is barely audible under extremely quiet listening conditions. Normal speech has a sound level of approximately 60 dB. Sound levels above approximately 120 dB begin to be felt inside the human ear as discomfort and eventually pain at still higher levels. The minimum change in the sound level of individual events that an average human ear can detect is approximately 3 dB. An increase (or decrease) in sound level of approximately 10 dB is usually perceived by the average person as a doubling (or halving) of the sound's loudness, this relation holds true for loud sounds and for quieter sounds.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly and are somewhat cumbersome to handle mathematically. However, some simple rules of thumb are useful in dealing with sound levels. First, if a sound's intensity is doubled, the sound level increases by 3 dB, regardless of the initial sound level. Thus, for example:

60 dB + 60 dB = 63 dB, and
80 dB + 80 dB = 83 dB

Hertz is a measure of how many times each second the crest of a sound pressure wave passes a fixed point. For example, when a drummer beats a drum, the skin of the drum vibrates a number of times per second. A particular tone that makes the drum vibrate 100 times per second generates a sound pressure wave that is oscillating at 100 Hz; this pressure oscillation is perceived as a tonal pitch of 100 Hz. Sound frequencies between 20 Hz and 20,000 Hz are within the range of sensitivity of the human ear.

Sound from a tuning fork (a pure tone) contains a single frequency. In contrast, most sounds one hears in the environment consist of a broad band of frequencies differing in sound level. The method commonly used to quantify environmental sounds consists of evaluating all of the frequencies of a sound according to a weighting system that reflects the fact that human hearing is less sensitive at low frequencies and extremely high frequencies than at the mid-range frequencies. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve, which de-emphasizes low and high frequencies of sound in a manner similar to the human ear.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of noise from several sources that creates a relatively steady background noise in which no particular source is identifiable. A single descriptor called the equivalent sound level (L_{eq}) represents the "equivalent" constant sound level that would have to be produced by a given source to equal the fluctuating level measured. L_{eq} is the mean A-weighted sound level during a measured time interval. In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the L_{max} and L_{min} indicators. They represent the maximum and minimum noise levels measured.

To describe the time-varying character of environmental noise, the statistical noise descriptors L_{10}, L_{50}, and L_{90} are commonly used. They are the noise levels equaled or exceeded during 10%, 50%, and 90% of a stated time. Sound levels associated with the L_{10} typically describe transient or short-term events, while levels associated with the L_{90} describe the steady-state (or most prevalent) noise conditions.

Another sound measure known as the day/night average noise level (L_{dn}) is defined as the A-weighted average sound level for a 24-hour day. It is calculated by adding a 10 dBA penalty to sound levels in the night (10 p.m. to 7 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours. The L_{dn} is used by agencies such as the U.S. Department of Housing and Urban Development, the State of California, Placer County, and the Town of Loomis (Town) to define acceptable land use compatibility with respect to noise.

Community Noise

Community noise is commonly described in terms of the "ambient" noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (L_{eq}), over a given time period (usually 1 hour). The L_{eq} is the foundation of the day/night average noise descriptor (L_{dn}), and shows very good correlation with community response to noise for the average person.

The L_{dn} is based on the average noise level over a 24-hour day, with a +10 dB weighting applied to noise occurring during nighttime (10 p.m. to 7 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because L_{dn} represents a 24-hour average, it tends to disguise short-term variations in the noise environment. Where short-term noise sources are an issue, noise impacts may be assessed in terms of maximum noise levels, hourly averages, or other statistical descriptors.

Perception of Loudness

The perceived loudness of sounds and corresponding reactions to noise are dependent on many factors, including sound pressure level, duration of intrusive sound, frequency of occurrence, time of occurrence, and frequency content. As mentioned above; however, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. Table 4.7-1 shows examples of noise levels for several common noise sources and environments.

Table 4.7-1
Typical A-Weighted Sound Levels of Common Noise Source

Sound	Sound Level(dBA)
12-gauge shotgun	160
Jet takeoff	140
Pneumatic riveter	124
Hammer drill	114
Chainsaw	110
Rock concert	105
Motorcycle	100
Tractor/hand drill	97
Lawnmower	90
Vacuum cleaner	80
City traffic	78
Conversation	65
Air conditioning unit	60
Floor fan	50
Electrical transformer	45
Refrigerator hum	40
Rustling leaves	30
Pin falling	15

Source: Bollard Acoustical Consultants 2015 (Appendix F).

Sound Propagation

It is commonly understood that sound decreases with distance. However, the propagation of sound is dependent on considerably more variables than distance alone. Those variables include the type of noise source (point, moving point, or line sources), the directionality of the noise source, the frequency content of the source (low frequency sound is absorbed in the atmosphere at a slower rate than high-frequency sound and therefore carries farther), atmospheric conditions (wind, temperature, humidity, gradients), ground type (e.g., dirt, grass fields, concrete), shielding (structures, noise barriers, topography), and vegetation.

For the purposes of assessing noise sources within the project site, traffic on public roadways is considered a "moving point" source. The sound level decay rate for this type of source is 4.5 dB per doubling of distance from the source.

Existing (Baseline) Noise Environment

The project site is adjacent to the north side of Interstate 80 (I-80), between King Road and Horseshoe Bar Road. The existing noise environment within the project site varies by location but is primarily defined by traffic noise. The most pervasive noise source affecting the project area is traffic on I-80.

Existing General Ambient Noise Environment

To quantify the existing ambient noise environment at the project site, long-term (continuous) ambient noise level measurements were conducted at five locations within the proposed project site from December 30, 2014, to January 1, 2015. The locations of the continuous noise monitoring sites are shown in Figure 4.7-1, Ambient Noise Measurement Locations, and the detailed results are shown in Appendix F.

Larson Davis Laboratories Model 820 precision integrating sound level meters were used for the long-term ambient noise level measurement surveys. The meters were calibrated before use with Larson Davis Laboratories Model CAL200 acoustical calibrators to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute.

The results of the long-term ambient noise measurement survey are summarized in Table 4.7-2. The data in Table 4.7-2 indicate that existing noise levels within the project site vary depending on location of the noise monitoring site relative to I-80. Inspection of the data showed that monitoring locations with the most direct view of I-80 recorded the highest noise levels during sampling. As shown in Table 4.7-2, the noise monitoring locations on the project site were exposed to existing traffic noise levels at or below 65 dBA L_{dn}. This was observed to be due primarily to shielding by intervening topography.

Table 4.7-2
Measured Baseline Noise Levels at Long-Term Monitoring Sites

Site	Location	Distance (feet)	Measured dBA L_{dn}
1	Along proposed extension of Doc Barnes Drive	210	64
2	Middle of site	230	63
3	Northern end of site	300	62
4	Southern end of site near Raley's property line	310	62
5	Southern end of site, mostly unshielded from I-80	250	65

Source: Bollard Acoustical Consultants 2015 (Appendix F).

Traffic Noise Assessment

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used with the CALVENO noise emission curves to predict existing traffic noise levels at the project site.

The FHWA Model provides reasonably accurate traffic noise predictions under "ideal" roadway conditions. Ideal conditions are generally considered to be long, straight roadway segments with uniform vehicle speeds, a flat roadway surface, good pavement conditions, a statistically large volume of traffic, and an unimpeded view of the roadway from the receiver location. Such conditions are not present at this project site due to topographical shielding partially obscuring the roadway from view. As a result, noise level data collected during the long-term monitoring conducted at the site were used with the FHWA Model to determine the amount of traffic noise reduction provided by topographic shielding.

The FHWA Model was used with existing traffic volumes for I-80 obtained from the California Department of Transportation 2013 Average Daily Traffic (ADT) count data to determine unshielded traffic noise levels at each of the five long-term monitoring sites. These predicted levels were then compared with the average measured levels to determine the amount of noise reduction provided by topographic shielding at these locations. The detailed FHWA inputs and results are shown in Appendix F, and the resulting offsets are shown in Table 4.7-3. Table 4.7-3 indicates that significant topographic shielding of I-80 traffic noise is present at the project site under existing conditions.

Table 4.7-3
Noise Reduction Offsets due to Existing Topographic Shielding

Site	Distance (ft)	Measured L_{dn}	FHWA Predicted L_{dn}	Offset (dB)
1	210	64	72	−8
2	230	63	72	−9
3	300	62	70	−8
4	310	62	70	−8
5	250	65	71	−6

Source: Bollard Acoustical Consultants 2015 (Appendix F).

The FHWA Model was used with traffic data provided by the project transportation consultant, KD Anderson & Associates, to predict existing traffic noise levels in the project vicinity. Table 4.7-4 shows the predicted existing traffic noise levels at a reference distance of 100 feet from the roadway centerlines, and the distances to the unshielded L_{dn} contours. The FHWA Model Inputs for baseline conditions are provided in Appendix F.

Table 4.7-4
Existing (Baseline) Traffic Noise Levels and Distances to Traffic Noise Contours

Roadway	Segment	dBA L_{dn}[1]	Distance to L_{dn} Contour (feet)		
			70	*52*	*60*
Taylor Road	South of Horseshoe Bar Road	58	16	34	74
Taylor Road	Horseshoe Bar Road – Webb Street	61	24	51	110
Taylor Road	Webb Street – King Road	60	21	46	99
King Road	Taylor Road – Boyington Drive	59	17	37	80
Horseshoe Bar Road	Taylor Road – Library Drive	59	20	42	91
Horseshoe Bar Road	Library Drive – Doc Barnes Drive	62	29	64	137
Horseshoe Bar Road	Doc Barnes Drive – I-80	62	29	64	137
Horseshoe Bar Road	I-80 – Laird Road	60	20	43	93
Day Avenue	King Road – David Avenue	46	2	5	11
Laird Street	Horseshoe Bar Road – Webb Street	48	4	8	17
Sun Knoll Drive	King Road – Thornwood Drive	45	2	5	10
Boyington Road	North of King Road	55	9	20	44
Webb Street	Taylor Road – Laird Street	46	3	6	12
Webb Street	King Road – Taylor Road	54	8	17	37
Doc Barnes Drive	Horseshoe Bar Road – Gates Drive	—	—	—	—
Doc Barnes Drive	Gates Drive – Blue Anchor Drive	—	—	—	—
Doc Barnes Drive	Blue Anchor Drive – King Road	—	—	—	—
Library Drive	Horseshoe Bar Road – Gates Drive	38	1	2	3
Interstate 80	Horseshoe Bar Road – Penryn Road	77	301	648	1,397

Source: Bollard Acoustical Consultants 2015 (Appendix F).
1 dBA L_{dn} was computed at a standardized distance of 100 feet from the roadway centerline.

4.7.2 Regulatory Setting

Federal and State Regulations

The 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations, provide some guidance as to the significance of changes in ambient noise levels due to transportation noise sources. The FICON recommendations are based on studies that relate aircraft and traffic noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that interferes with speech and conversation, sleep, or the desire for a tranquil environment.

The rationale for the FICON recommendations is that it is possible to consistently describe the annoyance of people exposed to transportation noise in terms of L_{dn}. The changes in noise exposure relative to existing noise levels, as shown in Table 4.7-5, are considered to be noticeable changes that result in increased annoyance experienced at sensitive land uses. Although the FICON recommendations were specifically developed to address aircraft noise impacts, they are used in this analysis for traffic noise described in terms of L_{dn}.

As shown in Table 4.7-5, an increase in noise from similar sources of 5 dBA or more would be noticeable where the ambient level is less than 60 dBA. Where the ambient level is between 60 and 65 dBA, an increase in noise of 3 dBA or more would be noticeable, and an increase of 1.5 dBA or more would be noticeable where the ambient noise level exceeds 65 dBA L_{dn}. The rationale for the criteria shown in Table 4.7-5 is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance.

Table 4.7-5
Measures of Substantial Increase for Transportation Noise Exposure

Ambient Noise Level Without Project	Significant Impact Occurs if the Project Increases Ambient Noise Levels by:
<60 dBA	+ 5 dBA or more
<60–65 dBA	+ 3 dBA or more
>65 dBA	+ 1.5 dBA or more

Source: FICON 1992.

Local Regulations

Town of Loomis General Plan

The following goals and policies are presented in the Town's General Plan Noise Element and are applicable to the proposed project (Town of Loomis 2001):

Goals

1. To protect Town residents and workers from the harmful and annoying effects of noise.
2. To mitigate the effects of noise created by roadway traffic and non-residential land uses while discouraging the construction of sound walls.
3. To maintain and where possible enhance the quiet, rural ambiance of the Town.
4. To minimize the noise effect of railroad operations on residential uses and other sensitive land uses.

Policies

1. New commercial and industrial development in the Town shall be sited and designed to minimize the potential for harmful or annoying noise to create conflict with existing land uses.

2. Loomis shall encourage the mitigation of noise impacts in all new developments as necessary to maintain the quiet, rural ambiance of the Town.
3. Individual noise exposure analysis shall be required for proposed development projects as part of the environmental review process, to ensure that the Town's noise standards are meet [sic]. The use of mitigation measures (noise buffers, sound insulation) may be required to reduce noise impacts to acceptable levels.
4. Loomis shall discourage the construction of sound walls to mitigate noise impacts, unless it is the only feasible alternative. New sensitive noise receptors shall not be permitted if the only feasible mitigation for noise impacts is a sound wall.
5. Where noise mitigation is necessary, the following order of preference among options shall be considered: distance from the noise source; muffling of the noise source; design and orientation of the receptor; landscaped berms; landscaped berms in combination with walls.
6. Use the land use/noise compatibility matrix shown on Figure 8-4 [in the General Plan Noise Element] to determine the appropriateness of land uses relative to roadway noise.
7. Provide for alternative transportation modes such as bicycle paths and pedestrian walkways to minimize the number of automobile trips.
8. Require that automobile and truck access to industrial and commercial properties adjacent to residential areas be located at the maximum practical distance from the residential area.
9. Limit the use of leaf blowers, motorized lawn mowers, parking lot sweepers, or other high-noise equipment on commercial properties if their activity will result in noise which adversely affects residential areas.
10. Require that the hours of truck deliveries to industrial and commercial properties adjacent to residential uses be limited to daytime hours unless there is no feasible alternative or there are overriding transportation benefits by scheduling deliveries at night.
11. Require that construction activities adjacent to residential units be limited as necessary to prevent adverse noise impacts (Town of Loomis 2001).

As shown in Table 4.7-6, the Noise Element establishes an exterior noise level standard of 65 dBA L_{dn} for transportation noise sources, applied at outdoor activity areas (backyards) of residential land uses. The intent of this standard is to provide an acceptable exterior noise environment for outdoor activities. Additionally, the Town uses an interior noise level standard of 45 dBA L_{dn} or less within noise-sensitive residential dwellings. The intent of this interior noise limit is to provide a suitable environment for indoor communication and sleep.

Table 4.7-6
Maximum Allowable Noise Exposure Levels (L_{dn})

Noise Sensitive Land Use	Outdoor Activity Areas[1, 2]	Interior Spaces	
	dBA L_{dn}	*dBA L_{dn}*	*dBA L_{eq}*
Residential	65	45	—
Transient lodging	65	45	—
Hospitals and nursing homes	65	45	—
Theaters, auditoriums, music halls	—	—	35
Churches, meeting halls	65	—	40
Office buildings	—	—	45
Schools, libraries, museums	—	—	45
Playgrounds, neighborhood parks	70	—	—

Source: Town of Loomis 2001, Table 8-3.
1 Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
2 Where it is not possible to reduce noise in outdoor activity areas to 65 dBA L_{dn}/Community Noise Equivalent Level (CNEL) or less using practical application of the best available noise reduction measures, an exterior noise level of up to 70 dBA L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

The General Plan also includes standards for short duration noise events near residential areas that are otherwise normally quiet. These standards, shown in Table 4.7-7, apply to land uses within close proximity to land uses or other activities that can produce high noise levels of a shorter duration.

Table 4.7-7
Noise Standards for Short Duration Events Near Residential Areas

Noise Sensitive Land Use	Duration of Sound (minutes per hour)	Standard	
		Day/Evening (7 am–10 pm) dBA	*Night (10 pm–7 am) dBA*
All Residential	30–60	50	40
	15–30	55	45
	5–15	60	50
	1–5	65	55
	<1 minute	70	60

Source: Town of Loomis 2001, Table 8-4.
Note: Where the offensive noise contains a steady, audible tone (such as a screech or hum), or is a repetitive noise such as hammering, or contains speech or music, the standard limits shown shall be reduced by 5 dBA.

4.7.3 Impacts

Methods of Analysis

The Town of Loomis General Plan Noise Element establishes an exterior noise level standard of 65 dBA L_{dn} for exterior and 45 dBA L_{dn} for interior residential land uses. As shown in Table 4.7-7, the Town does not have a noise ordinance that exempts short-term construction noise, but does provide standards for acceptable noise levels for specific durations.

The project site is located approximately 10 miles southeast of the Lincoln Regional Airport, 16 miles northeast from McClellan Airfield, 20 miles west of the Cameron Airpark, and 10 miles southeast from the Auburn Municipal Airport. The project is not within an adopted Airport Land Use Plan or within two miles of an airport or private landing strip that would expose future residents and employees to excessive noise. There would be no impact associated with noise from planes; therefore, these issues are not further addressed.

Significance Criteria

Potential impacts associated with noise have been evaluated using the following criteria, as identified in Appendix G of the CEQA Guidelines:

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

Impacts

IMPACT 4.7-1:	Generation of construction noise exceeding established noise standards or that causes a substantial temporary or periodic increase in ambient noise levels.
SIGNIFICANCE:	Potentially Significant
MITIGATION:	Mitigation Measure 4.7a
RESIDUAL SIGNIFICANCE:	Less Than Significant

During project construction, heavy equipment would be used for demolition, grading, paving, and building construction, which would increase ambient noise levels. Standard construction equipment, such as graders, backhoes, loaders, and trucks, would be used for this work. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project site would also vary depending on the proximity of construction activities to that point.

The range of maximum noise levels for various types of construction equipment at a distance of 50 feet is depicted in Table 4.7-8. The noise values represent maximum noise generation, or full-power operation of the equipment. As one increases the distance between equipment, or increases separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of combining separate noise sources.

Table 4.7-8
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pneumatic tool	85
Pump	76
Roller	74
Saw	76
Truck	88

Source: FTA 2006.

The nearest sensitive receptors to the proposed project are the residences located adjacent to the western and northern boundaries of the project site. The nearest residences are located directly adjacent to the project site. Other residences are located farther to the west and north. Construction of the proposed project would expose these sensitive receptors to increased ambient exterior noise levels. As shown in Table 4.7-8, outdoor noise levels at noise-sensitive receptors

50 feet from the noise source could reach as high as 89 dBA. The noise levels from construction operations decrease at a rate of approximately 6 dBA per doubling of distance from the source. In addition, a typical building can reduce noise levels by 25 dBA with the windows closed, which would reduce the maximum noise level to 64 dBA.

Noise generated by project construction could exceed the Town's standards for short duration events near residential areas, as listed in Table 4.7-7. Therefore, a potentially significant noise impact could occur during project construction. **Mitigation Measure 4.7a** identifies management practices to be implemented during construction to reduce noise exposure for adjacent residences to the extent feasible. These include limiting construction to daytime hours, using mufflers and noise-reducing features for construction equipment, using electrically powered equipment where feasible, locating material stockpiles and equipment staging areas as far as practicable from noise-sensitive receptors, limiting vehicle speed within the construction site, using signals, horns, and alarms for safety warning purposes only, and requiring that any public address or music systems must not be audible at any adjacent noise-sensitive receptor.

Existing residences that are closest to the project site would experience the greatest noise levels during the times when construction occurs at the perimeter of the site. Noise levels for adjacent residences would be lower when construction occurs within the central and southern portions of the site. Further, the noise levels provided in Table 4.7-8 reflect the maximum noise level generated by the equipment when operating at full power. During construction, the use of equipment varies such that equipment is typically not operated continuously at full power. Therefore, individual existing residences would not be continually exposed to the maximum construction noise levels. With implementation of the construction management practices included in **Mitigation Measure 4.7a**, the impacts from project construction would be reduced to a **less than significant** level.

IMPACT 4.7-2:	Exposure of people within the project site to traffic noise levels that exceed established noise standards.
SIGNIFICANCE:	Significant
MITIGATION:	Mitigation Measures 4.7b, 4.7c, 4.7d, 4.7e
RESIDUAL SIGNIFICANCE:	Less Than Significant

Exterior Noise Impacts

As described previously, the primary noise source affecting proposed residences on the project site is I-80. Proposed internal roadways, Doc Barnes Drive and Library Drive, which would be extended through the site as the primary site access roads, also contribute to the project area noise environment, but to a lesser extent. The FHWA Model was used to predict exterior traffic noise levels for internal project roadways. The results of that analysis are shown in Table 4.7-9.

Table 4.7-9
Cumulative Plus Project Traffic Noise Levels – Interior Roadways

Roadway	Segment	dBA L_{dn} at 100 feet	Distance to 60 dBA Contour (feet)
Doc Barnes Drive	Horseshoe Bar Road – Gates Drive	55	46
Doc Barnes Drive	Gates Drive – Blue Anchor Drive	52	31
Doc Barnes Drive	Blue Anchor Drive – King Road	52	28
Library Drive	Horseshoe Bar Road – Gates Drive	49	19

Source: Bollard Acoustical Consultants 2015 (Appendix F).

As shown in Table 4.7-9, traffic noise levels from internal roadways are predicted to be well within compliance with the Town of Loomis 65 dBA L_{dn} exterior noise standard at future residences constructed adjacent to these roadways. For the loudest roadway segment, Doc Barnes Drive between Horseshoe Bar Road and Gates Drive, the 60 dBA contour would be 46 feet from the roadway centerline. With a roadway width of 50 feet and a 17-foot-6-inch-wide landscape and trail section adjacent to the roadway, the nearest residential property would be 42 feet from the centerline. Similarly, Library Drive would have a 52-foot-wide right-of-way and the nearest residential property would be a minimum of 26 feet from the centerline.

As noted previously, the most substantial traffic noise source affecting the project site is I-80. I-80 traffic noise is currently reduced at the project site due to topographic shielding by intervening topography. The proposed grading plans indicate that I-80 traffic noise would continue to be partially shielded by intervening topography. This shielding is conservatively estimated to reduce exposure at the site to I-80 noise by 4 dBA.

Accounting for the estimated 4 dBA offset provided by intervening topography following site grading, and based on the predicted Cumulative Plus Project traffic volumes on I-80 (as identified in the Traffic Impacts Analysis in Appendix E), the predicted noise level at the nearest residences is approximately 71 dBA L_{dn}, which exceeds the Town's 65 dBA L_{dn} exterior standard. Therefore, impacts would be significant and **Mitigation Measure 4.7b** requires construction of a sound wall along Doc Barnes Drive to provide the necessary amount of noise attenuation to achieve compliance with the Town's exterior noise level standards.

As noted in Section 4.7.2, Regulatory Setting, the Town discourages the construction of sound walls to mitigate noise impacts unless it is the only feasible alternative. In addition, where noise mitigation is necessary, the Town's noise policy states that the following order of preference among options shall be considered: increasing distance from the noise source, muffling of the noise source, modifying the design and orientation of the receptor, landscaped berms, and landscaped berms in combination with walls.

The design of this project is such that noise mitigation measures have been incorporated in the project plans. Specifically, setbacks from I-80 have been built into the project design by locating Doc Barnes Drive adjacent to the I-80 right-of-way, with the nearest proposed residences located farther north. The project grading plans also incorporate a degree of topographic shielding to provide additional reduction of I-80 traffic noise levels at the project site. The use of 6-foot-tall noise barriers would provide the final degree of noise reduction required to achieve satisfaction with the Town's noise standards.

Interior Noise Impacts

Interior noise levels within the project site would be dependent on the exterior noise levels described above, and the level of noise attenuation achieved through standard construction practices. With construction of the noise barrier required by **Mitigation Measure 4.7b**, exterior noise levels would be approximately 65 dBA or less at first-floor façades. Standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof) typically results in an exterior to interior noise reduction of approximately 25 dBA with windows closed, and approximately 15 dBA with windows open. Therefore, standard construction practices would be adequate for first-floor façades of all residences constructed within the project, provided mechanical equipment is included in the project construction to allow occupants to close doors and windows as desired for additional acoustical isolation. To that end, **Mitigation Measure 4.7c** requires that air conditioning units be provided in each residential unit so that residents would have the option of leaving doors and windows closed.

Due to reduced ground absorption and topographic shielding at elevated positions, second-floor traffic noise levels would be approximately 4 dBA higher than first-floor levels. In addition, second-floor façades would not be shielded by the required noise barriers. As a result, second floor exposure of the residences proposed adjacent to I-80 would be approximately 75 dBA L_{dn}. As described above, standard construction practices would result in an exterior to interior noise reduction of about 25 dBA with windows closed, and approximately 15 dBA with windows open. Even with the 25 dBA reduction with windows closed, interior noise levels would be 50 dBA, which exceeds the Town's interior noise standard of 45 dBA. Therefore, impacts would be significant and **Mitigation Measure 4.7d** is provided to ensure interior noise levels comply with the Town's standard by requiring higher STC ratings on second-floor windows with a view of I-80.

Noise Impacts on Future High-Density Residential Uses

In addition to the proposed development considered in the analysis above, high-density residential uses are proposed in the southwestern portion of the project site. Because specific site development plans have not been completed for this component of the project, it is not feasible to evaluate potential noise impacts at exterior or interior spaces of that future development. However, due to I-80 traffic noise exposure and noise generated by periodic truck deliveries to the adjacent Raley's store, it is possible that noise impacts could occur at this future high-density residential component of the proposed project. Therefore, potential impacts would be significant, and **Mitigation Measure 4.7e** is provided to require that future development plans for the multifamily component of the project are reviewed by an acoustical consultant to verify that project design incorporates appropriate measures to ensure that the Town's noise standards are achieved and impacts are reduced to a **less than significant** level.

IMPACT 4.7-3:	Excessive groundborne vibration/noise.
SIGNIFICANCE:	No Impact
MITIGATION:	None
RESIDUAL SIGNIFICANCE:	No Impact

As described under Impact 4.7-1, project construction would involve use of a variety of heavy equipment; however, the types of equipment anticipated to be used would not generate groundborne vibration levels that would impact off-site sensitive receptors. The construction would include site grading, excavation for utilities, foundation work and building construction, and paving. Even with potential use of a vibratory roller for compaction of structural foundation areas, none of these construction activities is a source for substantial temporary groundborne vibration. The project construction would not involve the principal sources for vibration generation and complaints, which are pile driving and blasting. After construction, the project would not include any operations that would result in groundborne vibration or noise that would be perceptible off site. Therefore, the project would have **no impacts** with respect to groundborne vibration and noise.

IMPACT 4.7-4:	Traffic noise levels causing a substantial permanent increase in ambient noise levels.
SIGNIFICANCE:	No Impact
MITIGATION:	None
RESIDUAL SIGNIFICANCE:	No Impact

Existing and Existing Plus Project Traffic Noise

With development of the proposed project, traffic volumes on the local roadway network would increase. Those increases in daily traffic volumes would result in a corresponding increase in traffic noise levels. The FHWA Model was used with traffic data provided by K.D. Anderson & Associates for the project to predict existing and Existing Plus Project traffic noise levels, and the project-related noise level increases. The FHWA Model input data is contained in Appendix F. Table 4.7-10 shows existing and Existing Plus Project traffic noise levels on the regional roadway network and the amount of changes in noise levels.

Table 4.7-10
Existing and Existing Plus Project Traffic Noise Levels

Roadway	Segment	Existing dBA L_{dn}	Existing + Project dBA L_{dn}	Change (dBA)	Substantial Increase?
Taylor Road	South of Horseshoe Bar Road	58.1	58.5	0.4	No
Taylor Road	Horseshoe Bar Road – Webb Street	60.6	60.4	−0.2	No
Taylor Road	Webb Street – King Road	59.9	59.7	−0.2	No
King Road	Taylor Road – Boyington Drive	58.6	57.6	−0.9	No
Horseshoe Bar Road	Taylor Road – Library Drive	59.4	59.6	0.2	No
Horseshoe Bar Road	Library Drive – Doc Barnes Drive	62.0	62.2	0.2	No
Horseshoe Bar Road	Doc Barnes Drive – I-80	62.0	62.9	0.8	No
Horseshoe Bar Road	I-80 – Laird Road	59.5	59.7	0.1	No
Day Avenue	King Road – David Avenue	45.5	45.5	0.0	No
Laird Street	Horseshoe Bar Road – Webb Street	48.4	49.4	1.0	No
Sun Knoll Drive	King Road – Thornwood Drive	45.0	45.0	0.1	No
Boyington Road	North of King Road	54.6	54.8	0.2	No
Webb Street	Taylor Road – Laird Street	46.1	47.0	0.9	No
Webb Street	King Road – Taylor Road	53.6	53.6	0.1	No
Doc Barnes Drive	Horseshoe Bar Road – Gates Drive	—	55.7	N/A	N/A
Doc Barnes Drive	Gates Drive – Blue Anchor Drive	—	53.0	N/A	N/A
Doc Barnes Drive	Blue Anchor Drive – King Road	—	52.3	N/A	N/A

Table 4.7-10
Existing and Existing Plus Project Traffic Noise Levels

Roadway	Segment	Existing dBA L_{dn}	Existing + Project dBA L_{dn}	Change (dBA)	Substantial Increase?
Library Drive	Horseshoe Bar Road – Gates Drive	37.8	49.0	11.2	Yes
I-80	Horseshoe Bar Road – Penryn Road	77.2	77.2	0.0	No

Source: Bollard Acoustical Consultants 2015 (Appendix F).

As shown in Table 4.7-10, the project would not result in any substantial increases in traffic noise levels except for along Library Drive. However, Library Drive traffic is not the primary noise source at the nearest noise-sensitive receptor (an outdoor activity/picnic area near the existing library, approximately 100 feet from the centerline of Library Drive) due to a low existing traffic volume on the roadway. To more accurately quantify the existing ambient noise level in this area, Bollard Acoustical Consultants conducted a short-term (15 minute) noise level measurement at the site on August 18, 2015. The location of this measurement is shown on Figure 4.7-1, and the results are summarized below in Table 4.7-11.

Table 4.7-11
Short-Term Noise Measurement Results

Site	Location	Measured L_{eq} (dB)	Predicted L_{dn} (dB)[1]	Change with Project
A	Library Drive outdoor activity/picnic area	47	53	Insignificant[2]

Source: Bollard Acoustical Consultants 2015 (Appendix F).
1 Predicted L_{dn} estimated with conservative assumption that measured L_{eq} is constant.
2 Existing L_{dn} plus project traffic L_{dn} would be less than 1 dBA greater than existing L_{dn}.

As shown in Table 4.7-11, the existing measured ambient noise level at the outdoor activity/picnic area is greater than the predicted Library Drive traffic noise level after project construction. Additionally, both the existing and Existing Plus Project noise levels at this area are predicted to be well below the Town's exterior noise standard of 70 dBA L_{dn} for neighborhood parks. As a result, the proposed project would result in **no impact** related to increases in off-site traffic noise impacts relative to existing conditions.

IMPACT 4.7-5:	Traffic noise levels causing a substantial permanent increase in cumulative noise levels.
SIGNIFICANCE:	No Impact
MITIGATION:	None
RESIDUAL SIGNIFICANCE:	No Impact

Cumulative and Cumulative Plus Project Traffic Noise

Using the same methodology described previously, traffic noise levels were predicted for future (cumulative, Year 2030) and future plus project conditions. Table 4.7-12 shows the results of the cumulative traffic noise analysis.

Table 4.7-12
Cumulative and Cumulative Plus Project Traffic Noise Levels

Roadway	Segment	Cumulative dBA L_{dn}	Cumulative + Project dBA L_{dn}	Change (dBA)	Substantial Increase?
Taylor Road	South of Horseshoe Bar Road	59.1	59.2	0.1	No
Taylor Road	Horseshoe Bar Road – Webb Street	61.6	61.5	−0.1	No
Taylor Road	Webb Street – King Road	60.4	60.4	−0.1	No
King Road	Taylor Road – Boyington Drive	60.1	59.9	−0.2	No
Horseshoe Bar Road	Taylor Road – Library Drive	60.3	60.1	0.1	No
Horseshoe Bar Road	Library Drive – Doc Barnes Drive	63.0	63.1	0.1	No
Horseshoe Bar Road	Doc Barnes Drive – I-80	62.9	63.7	0.8	No
Horseshoe Bar Road	I-80 – Laird Road	61.3	61.1	−0.2	No
Doc Barnes Drive	Horseshoe Bar Road – Gates Drive	—	55.0	N/A	N/A
Doc Barnes Drive	Gates Drive – Blue Anchor Drive	—	52.4	N/A	N/A
Doc Barnes Drive	Blue Anchor Drive – King Road	—	51.6	N/A	N/A
Library Drive	Horseshoe Bar Road – Gates Drive	37.8	49.3	11.5	Yes
I-80	Horseshoe Bar Road – Penryn Road	78.6	78.6	0.0	No

Source: Bollard Acoustical Consultants 2015 (Appendix F).

As shown in Table 4.7-12, the project would result in a substantial increase in traffic noise levels along Library Drive relative to cumulative conditions without the project. The proposed project would add office uses, Village Residential, and High-Density Multiple Family uses along Library Drive. However, because ambient noise levels at this location are greater than the noise that would be generated by project traffic noise, the project traffic noise would not alter ambient noise levels in this location, as described under Impact 4.7-4. As a result, the proposed project would result in **no impact** related to off-site traffic noise impacts relative to cumulative baseline conditions.

4.7.4 Mitigation Measures

4.7a The project applicant shall ensure that all contractors implement the following measures during construction of the proposed project:

- Project construction activities shall be limited to daytime hours of 7:00 a.m. to 7:00 p.m. Monday through Friday, and 8:00 a.m. to 7:00 p.m. on Saturdays unless conditions warrant that certain construction activities occur during evening or early morning hours (e.g., extreme heat).
- All noise-producing project equipment and vehicles using internal-combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc welders, air compressors) shall be equipped with shrouds and noise-control features that are readily available for that type of equipment.
- All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors. Material stockpiles and staging areas shall be indicated on project plans prior to issuance of grading and building permits.
- Construction site and access road speed limits shall be established and enforced during the construction period. Speed limits shall be noted on project plans prior to issuance of grading and building permits.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only. This prohibition shall be noted on project plans prior to issuance of grading and building permits.
- No project-related public address or music system shall be audible at any adjacent receptor. This prohibition shall be noted on project plans prior to issuance of grading and building permits.

4.7b To ensure compliance with the Town of Loomis's (Town) 65 dBA L_{dn} exterior noise level standard, the project applicant shall install 6-foot-high solid noise barriers adjacent to the proposed residential uses along the eastern boundary of the project site, as shown in Figure 4.7-2, Project Site Plan and Recommended Noise Barrier Locations, to reduce traffic noise levels from Interstate 80. The noise barriers shall be constructed of concrete or other solid material that is rigid and sufficiently dense (at least 20 kilograms/square meter) (FHWA 2015). The Town of Loomis shall ensure that the noise barriers are shown on construction plans prior to issuance of grading permits and shall verify the barriers have been constructed as required prior to issuance of certificates of occupancy.

4.7c The project applicant shall install air conditioning in all residences constructed within the proposed project to allow occupants to close doors and windows as desired for additional acoustical isolation. The Town of Loomis shall ensure that building plans include the required air conditioning equipment prior to issuance of building permits.

4.7d To ensure compliance with the Town's 45 dBA L_{dn} interior noise level standard, all second-floor bedroom windows of the lots adjacent to Doc Barnes Drive from which Interstate 80 is visible shall have a minimum Sound Transmission Class (STC) rating of 32. The lots requiring window upgrades are shown in Figure 4.7-2. The Town of Loomis shall ensure that building plans include STC 32 windows on second-floor bedroom windows of the lots adjacent to Doc Barnes Drive from which Interstate 80 is visible prior to issuance of building permits.

4.7e At the time specific site development plans are developed for the proposed high-density residential component of the project, those plans shall be reviewed by an acoustical consultant to ensure that adequate shielding of outdoor activity areas and adequate interior sound isolation have been incorporated into the design and construction details to ensure compliance with the Town's 45 dBA L_{dn} interior and 65 dBA L_{dn} exterior noise standards.

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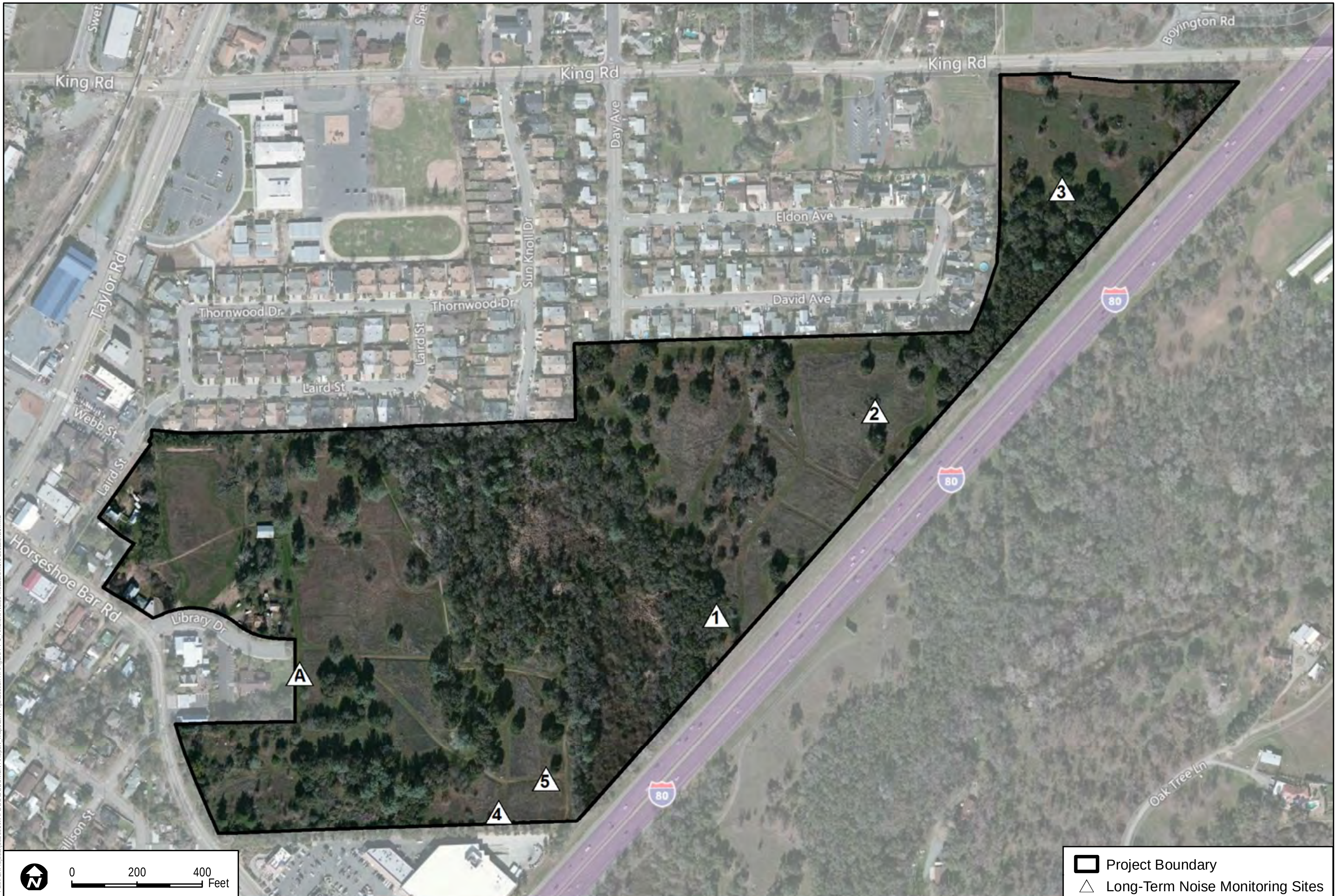

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SOURCE: Bing Maps 2016; Google Maps 2016

FIGURE 4.7-1

Ambient Noise Measurement Locations

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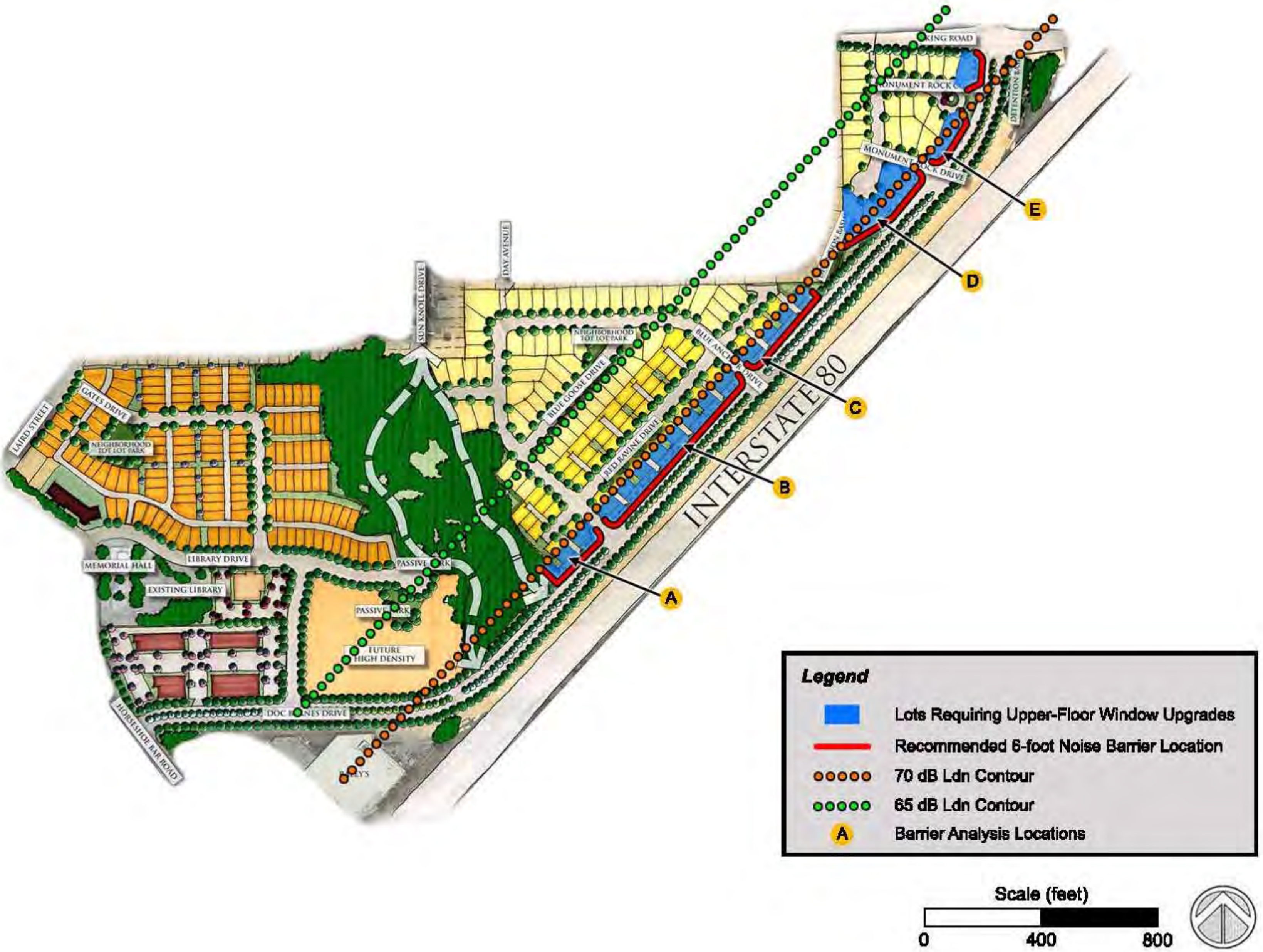

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SOURCE: BOLLARD ACOUSTICAL CONSULTANTS 2016

FIGURE 4.7-2

Project Site Plan and Recommended Noise Barrier Locations

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