

ENVIRONMENTAL SETTING

Project Location and Description:

The proposed Covell Village project is located on the northwest corner of Covell Boulevard and Pole Line Road, east of the Union Pacific Railroad (UPRR) and F Street, in the City of Davis, California. The project includes approximately 414 acres of land, and will contain residential, commercial, school, park, greenway, and wildlife habitat land uses.

The project includes one “High Density” alternative to the “Proposed Project.” The High Density alternative includes an additional 343 single-family units and 317 co-housing units. This alternative would eliminate the “senior only” home sites and hospice facility. The general project layout will be relatively unchanged for both project scenarios (at least with respect to noise), and is presented in Figure 1.

Acoustical Terminology:

Noise is often described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, or Hertz (Hz). Human hearing is generally capable of detecting sound between 20 Hz and 20,000 Hz.

Human hearing is generally capable of processing these pressure variations (sound) over an extremely broad dynamic range; therefore, the measurement of sound directly in terms of pressure would require a very large and awkward range of numbers. The logarithmic treatment of these numbers - converting measured sound pressure (Pa) into sound pressure level (decibels - dB) - was devised primarily to limit the range of numbers; the decibel scale allows for 5 orders of magnitude in sound pressure to be expressed as a range of 100 dB.

The perceived loudness of sounds is dependent on many factors, including sound pressure level and frequency content. However, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by the A-weighting network. There is a strong correlation between A-weighted sound levels (expressed as dBA) and the way the human ear perceives noise. For this reason, the A-weighted sound level has become a standard tool for environmental noise assessment. All noise levels reported in this section are in terms of A-weighted levels.

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}), which

corresponds to a steady-state, A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation for the Day/Night Average Noise Level (L_{dn}).

TABLE 1

ACOUSTICAL TERMINOLOGY

Acoustics	The science (or physics) of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of noise.
A-Weighting	A frequency-response filter that conditions a given sound signal to approximate human response.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours (10 p.m. - 7 a.m.) weighted by a factor of 10 prior to averaging.
Decibel or dB	A Bel is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bel.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz (Hz).
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
L_n	The measured sound pressure level exceeded (n) percent of the time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Noise	Unwanted sound.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB at 1,000 Hz for persons with good hearing.
SEL	A single-number rating indicating the total energy of a discrete noise event compressed into a 1-second time duration.

The L_{dn} is based on the average noise level over a continuous 24-hour period, with a +10 dB

weighting applied to noise occurring during nighttime (10 p.m. to 7 a.m.) hours. The nighttime penalty is based on 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.

Table 1 provides definitions of acoustical terminology relevant to this study.

Existing Land Uses in the Project Vicinity:

The project site is currently vacant and undeveloped. The project site is bordered on three sides (east, west, and south) by existing urban/suburban uses, including residential, commercial, park, and golf course. To the north, the site is bordered by existing agricultural uses in addition to the Blue Max Kart Club race track facility.

Noise-sensitive land uses in the immediate project vicinity include existing single-family and multi-family residences to the west and east.

Existing Noise Environment in the Project Vicinity:

The existing ambient noise environment in the immediate project vicinity is defined primarily by operations on Pole Line Road, F Street, the UPRR, and the Blue Max Kart Club facility.

To quantify the existing ambient noise environment in the project vicinity, ambient noise level measurement surveys were conducted at four locations on the project site on October 17, 2003 and October 20-21, 2004. The noise measurement locations are shown in Figure 1. Long-term (24-hour) measurements were completed at Site 1 (north side near Kart track) and Site 4 (east side), while short-term (15-minute) samples were collected at Sites 2 & 3.

A Larson-Davis Laboratories (LDL) Model 820 precision integrating sound level meter was used for the noise level measurement surveys. The meter was calibrated before use with a LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute (ANSI) for Type 1 (precision) sound level meters (ANSI S1.4).

Ambient noise level survey results are presented in Figures 2 & 3, and Table 2. The ambient noise measurement surveys revealed that existing noise levels in the immediate project vicinity were consistent with typical commercial/residential land uses in urban/suburban settings.

TABLE 2

**SUMMARY OF AMBIENT NOISE LEVEL MEASUREMENTS
15-MINUTE SAMPLES B OCTOBER 17, 2003
COVELL VILLAGE B DAVIS, CALIFORNIA**

Site	Location	L_{eq}	L_{max}	Noise Sources
2	Southeast Corner	59	71	Traffic on Pole Line and Covell
3	Southwest Corner	60	67	Traffic on Covell

Source: Bollard & Brennan, Inc.

Roadway Traffic Noise:

To predict existing noise levels due to traffic, the Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA RD-77-108) was used. The Model is based on the Calveno reference noise factors for automobiles, medium trucks, and heavy trucks, with consideration given to vehicle volume, speed, roadway configuration, distance to the receiver, and the acoustical characteristics of the project site. The FHWA Model was developed to predict hourly L_{eq} values for free-flowing traffic conditions. A day/night traffic distribution of 83%/17% was factored into the calculations to determine L_{dn}. Additionally, a medium/heavy truck split of 2%/1% was assumed, along with traffic speed of 30-45 MPH.

Traffic volumes for existing conditions were obtained from the Traffic Impact Study prepared for the project by Fehr & Peers Transportation Consultants (October 2004). The data within that report is in the form of AM/PM peak-hour intersection turning movements, which was converted to ADT by Bollard & Brennan, Inc.

Table 3 shows the existing traffic noise levels in terms of L_{dn} at a reference distance of 75 feet from the centerlines of existing project-area roadways. These are considered to be the Abaseline@ conditions. The table also includes the distances to existing traffic noise contours.

TABLE 3

**EXISTING TRAFFIC NOISE LEVELS AND CONTOUR DISTANCES
COVELL VILLAGE B DAVIS, CALIFORNIA**

Roadway	Segment	L _{dn} @ 75 Feet	Distance to Contours (feet)		
			70 dB	65 dB	60 dB
Covell Blvd.	W. of F Street	63.9	29	63	136
Covell Blvd.	F Street – J Street	64.2	31	66	142
Covell Blvd.	J Street – L Street	64.0	30	64	139
Covell Blvd.	L Street – Pole Line Rd.	63.8	29	63	135
Covell Blvd.	E. of Pole Line Rd.	62.4	23	50	108
Pole Line Rd.	Covell Village Rd. – Moore Ave.	63.5	28	60	128
Pole Line Rd.	Moore Ave. – Donner Ave.	64.4	32	68	147
Pole Line Rd.	Donner Ave. – Picasso Ave.	65.0	35	75	161
Pole Line Rd.	Picasso Ave. – Covell Blvd.	65.9	40	86	185
Pole Line Rd.	S. of Covell Blvd.	65.0	35	76	163
F Street	N. of Covell Blvd.	61.1	19	41	89
F Street	S. of Covell Blvd.	62.3	23	49	106
J Street	S. of Covell Blvd.	56.7	10	21	45
L Street	Covell Blvd. – Drexel Dr.	56.3	9	20	42
L Street	Drexel Dr. – 8 th Street	56.8	10	21	46
L Street	S. of 8 th Street	58.4	13	27	59
Moore Blvd.	E. of Pole Line Rd.	56.3	9	20	42
Donner Ave.	E. of Pole Line Rd.	53.6	6	13	28
Picasso Ave.	E. of Pole Line Rd.	56.0	9	19	41

Source: FHWA-RD-77-108 with inputs from Abrams Associates and Bollard & Brennan, Inc.

Railroad Noise:

As described above, the project site is directly adjacent to a branch of the UPRR along the west property boundary. Long-term (48-hours) noise measurements at Measurement Site 4, approximately 55 feet from the centerline of the tracks, showed an average of 3 daytime/0 nighttime train events during the measurement period. The average measured train SEL was recorded to be approximately 99 dB at 55 feet. The calculated noise exposure from train events at this measurement site is approximately 54 dB L_{dn}.

Go-Kart Track Noise:

As described above, the project site is directly adjacent to the Blue Max Kart Club racetrack on the northeast corner. Long-term noise measurements at Measurement Site 1, approximately 125 feet from the center of the go-kart track, yielded an average measured noise exposure of approximately 62 dB L_{dn} and maximum Hourly L_{eq} of 71 dB. Based on the detailed measurement results, this exposure was primarily due to activities on the go-kart track, with only minor contribution from traffic on Pole Line Road.

REGULATORY SETTING

In order to limit population exposure to physically and/or psychologically damaging noise levels, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. The City of Davis General Plan Noise Element, Noise Ordinance, and CEQA provide regulations regarding noise levels for uses relevant to the proposed project. The following provides a general overview of the existing regulations established by the City and CEQA.

City of Davis Noise Element Criteria:

The City of Davis General Plan Noise Element requires that interior noise exposure from exterior noise sources (traffic) within residential dwellings not exceed 45 dB L_{dn} (or CNEL), regardless of exterior noise exposure. This standard is increased to 55 dB L_{dn} or less for office/professional uses.

The City of Davis has established an exterior noise level criterion of less than 60 dB L_{dn} (or CNEL) within outdoor activity areas of residential land uses. This standard is adjusted to a level less than 65 dB L_{dn} for office/professional uses. These are considered to be the Normally Acceptable criteria, and may be adjusted upward (60-70 dB L_{dn} for residential, 65-75 dB L_{dn} for office/professional) based on compliance with the interior noise criterion and the City's discretion.

City of Davis Noise Ordinance Criteria:

The City of Davis noise ordinance establishes a maximum noise level standard of 55 dB during the hours of 7:00 a.m. to 9:00 p.m., and 50 dB during the hours of 9:00 p.m. to 7:00 a.m. These "maximum" criteria are interpreted by Bollard & Brennan, Inc. to be average hourly levels (L_{eq}).

IMPACTS AND MITIGATION MEASURES B PROPOSED PROJECT

Standards of Significance:

Generally, a project may have a significant effect on the environment if it will substantially increase the ambient noise levels at adjoining areas or expose people to severe noise levels. In practice, more specific professional standards have been developed, as discussed previously in the Regulatory Setting Section above. These standards state that a noise impact may be considered significant if it would generate noise that would conflict with local planning criteria. The local planning standards applicable to this project are as follows.

City of Davis Noise Element Criteria:

The City of Davis General Plan Noise Element requires that interior noise exposure from exterior noise sources (traffic) within residential dwellings not exceed 45 dB L_{dn} (or CNEL), regardless of exterior noise exposure. This standard is increased to 55 dB L_{dn} or less for office/professional uses.

The City of Davis has established an exterior noise level criterion of less than 60 dB L_{dn} (or CNEL) within outdoor activity areas of residential land uses. This standard is adjusted to a level less than 65 dB L_{dn} for office/professional uses. These are considered to be the "Normally Acceptable" criteria, and may be adjusted upward (60-70 dB L_{dn} for residential, 65-75 dB L_{dn} for office/professional) based on compliance with the interior noise criterion and the City's discretion.

City of Davis Noise Ordinance Criteria:

The City of Davis noise ordinance establishes a maximum noise level standard of 55 dB during the hours of 7:00 a.m. to 9:00 p.m., and 50 dB during the hours of 9:00 p.m. to 7:00 a.m. These "maximum" criteria are interpreted by Bollard & Brennan, Inc. to be average hourly levels (L_{eq}).

Additionally, noise impacts associated with the proposed project would be considered significant if they expose existing noise-sensitive land uses to a traffic noise level increase of 3 dB or more.

Analysis:

Off-Site Noise Impact Assessment:

The identified noise-producing elements associated with this project are increased traffic noise on the local roadway network and project-related construction. This analysis focuses on these noise sources.

Traffic Noise Impact Assessment:

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at a representative distance (75 feet from the roadway centerline) for the Existing + Project and Cumulative (2015) + Project conditions. The traffic noise levels were predicted using the same modeling methodology described in the Setting Section above. Predicted traffic noise levels are presented in Table 4.

TABLE 4

**PREDICTED TRAFFIC NOISE LEVELS AT 75 FEET FROM ROADWAY CENTERLINES
COVELL VILLAGE B DAVIS, CALIFORNIA**

Roadway	Segment	L _{dn} , dB (change, dB)	
		Existing + Project	Cumulative (2015) + Project
Covell Blvd.	W. of F Street	64.9 (+1.1)	65.7 (+0.8)
Covell Blvd.	F Street – J Street	65.8 (+1.6)	66.7 (+1.1)
Covell Blvd.	J Street – L Street	65.9 (+1.9)	66.7 (+1.3)
Covell Blvd.	L Street – Pole Line Rd.	65.2 (+1.4)	66.3 (+0.9)
Covell Blvd.	E. of Pole Line Rd.	63.5 (+1.1)	65.0 (+0.7)
Pole Line Rd.	N. of Covell Village Rd.	64.3 (NA)	65.5 (NA)
Pole Line Rd.	Covell Village Rd. – Moore Ave.	64.8 (+1.3)	65.6 (+0.9)
Pole Line Rd.	Moore Ave. – Donner Ave.	66.4 (+2.0)	67.4 (+1.4)
Pole Line Rd.	Donner Ave. – Picasso Ave.	67.2 (+2.2)	68.0 (+1.6)
Pole Line Rd.	Picasso Ave. – Covell Blvd.	67.9 (+2.0)	68.5 (+1.5)
Pole Line Rd.	S. of Covell Blvd.	66.5 (+1.5)	67.5 (+1.1)
F Street	N. of Covell Blvd.	61.8 (+0.7)	62.5 (+0.6)
F Street	S. of Covell Blvd.	63.1 (+0.8)	63.9 (+0.6)
J Street	S. of Covell Blvd.	58.3 (+1.6)	59.2 (+0.8)
L Street	Covell Blvd. – Drexel Dr.	59.6 (+3.3)	59.8 (+2.8)
L Street	Drexel Dr. – 8 th Street	59.9 (+3.1)	60.6 (+2.2)
L Street	S. of 8 th Street	60.6 (+2.2)	60.6 (+2.2)
Moore Blvd.	E. of Pole Line Rd.	57.5 (+1.3)	59.4 (+0.8)
Donner Ave.	E. of Pole Line Rd.	54.2 (+0.6)	54.5 (+0.6)
Picasso Ave.	E. of Pole Line Rd.	57.0 (+1.0)	57.2 (+1.0)

Source: FHWA-RD-77-108 with inputs from Fehr & Peers and Bollard & Brennan, Inc.

Project Construction Noise Impact Assessment:

During the construction phases of the project, noise from building equipment would add to the noise environment in the immediate project vicinity. Activities involved in construction would likely generate maximum noise levels, as indicated in Table 5, ranging from 85-88 dB at a distance of 50 feet. Construction activities would be temporary in nature and are anticipated to occur during normal daytime working hours (7 a.m.-5 p.m.). Still, residences located along the east and west sides of the project site will likely be impacted by this noise.

TABLE 5
CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	L _{max} dB at 50 feet
Bulldozers	87
Heavy Trucks	88
Backhoe	85
Pneumatic Tools	85

Source: Environmental Noise Pollution, Patrick R. Cunniff, 1977.

Noise would also be generated during the construction phase by increased truck traffic on local area roadways. A significant project-generated noise source would be truck traffic associated with the transport of heavy materials and equipment to and from the construction site.

On-Site Noise Impact Assessment:

The project site may be impacted by traffic noise from operations on F Street, Covell Boulevard, and Pole Line Road. In addition, noise exposure from operation on the UPRR, and activities at the Blue Max Kart Club, are examined herein.

Traffic Noise Impact Assessment:

As shown in Table 4 above, unmitigated Cumulative (2015) + Project traffic noise exposure on the project site is expected to exceed 60 dB L_{dn} at all of the project perimeter roadways. Traffic noise on the project site may be mitigated using appropriate project setbacks, property line noise barriers, and/or appropriate project building orientation and layout.

To provide the noise level reduction required to meet the City's exterior Noise Element criterion, Bollard & Brennan, Inc. estimates that property line noise barriers of approximately 6-9 feet in height would be required.

Bollard & Brennan, Inc. recommends that a detailed traffic noise analysis be performed for the project site once a specific site design has been determined, and tentative maps are available.

Union Pacific Railroad Noise Impact Assessment:

Measurements of existing Railroad noise in the project vicinity yielded a total of three daytime operations (no nighttime operations), producing a noise exposure at 55 feet from the centerline of the tracks of 99 dB SEL and 54 dB L_{dn}. No future operations data is available for the UPRR adjacent to the project site. However, if it is not expected that operations on this section of track will increase significantly within the foreseeable future; future noise exposure from this source on the project site is not expected to exceed 60 dB L_{dn}, and will not be significant.

Blue Max Kart Club:

Measurements of typical Blue Max Kart Club activities on the north boundary of the project site yielded noise exposure of approximately 62 dB L_{dn} and approximately 71 dB L_{eq}. This exposure currently exceeds the City's exterior noise exposure criteria. Typical activities at the Club are not expected to change in the future: Therefore, typical unmitigated noise exposure on the project site is not expected to exceed the measured value of 62 dB L_{dn} and 71 dB L_{eq}. However, worst-case operations times, such as race weekends and other special events, would likely produce higher noise levels on the project site.

To provide the 16 dB of noise level reduction required to meet the City's daytime Noise Ordinance criterion, Bollard & Brennan, Inc. estimates that a property line noise barrier of no less than approximately 12 feet in height would be required.

Bollard & Brennan, Inc. recommends that a specific acoustical analysis be conducted accounting for worst-case noise activities at the Kart Club and the proposed project layout on the northeast corner of the project property.

SPECIFIC IMPACTS AND MITIGATION STATEMENTS B PROPOSED PROJECT

Impact 1: **Impacts of Off-Site Traffic on On-Site Noise-Sensitive Uses:** The project site is located immediately adjacent to F Street, Covell Boulevard, and Pole

Line Road. As presented above, Cumulative (2015) + Project traffic noise exposure on the project site may be as high as 69 dB L_{dn} , exceeding the 60 dB L_{dn} exterior noise criterion. Additionally, Cumulative (2015) + Project traffic noise exposure levels may exceed the 45 dB L_{dn} interior noise standard within proposed dwellings. **Therefore, this impact is considered to be significant.**

Mitigation 1:

The following measures may be used to mitigate traffic noise exposure at future residences (outdoor activity areas) on the project site.

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The Arule-of-thumb@ is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively.

Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends on the relative heights of the source, barrier, and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

To provide the noise level reduction required to meet the City's exterior Noise Element criterion, Bollard & Brennan, Inc. estimates that property line noise barriers of approximately 6-9 feet in height would be required.

Due to the many variables which need to be considered for determining the effectiveness of a barrier, a detailed acoustical analysis should be conducted by a qualified acoustical consultant.

Site Design, Building Locations, and Building Orientations

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment.

Building Design and Construction Improvements

Proposed project buildings closest to the perimeter noise sources may be designed to minimize exterior-to-interior noise transmission, thus minimizing interior noise exposure, by 1) limiting the area of acoustically weak building elements (i.e., windows and doors) in the exterior building façade design, and 2) providing acoustically rated windows and doors at the most highly noise impacted building façades.

Detailed Acoustical Analysis

Bollard & Brennan, Inc. recommends that a detailed acoustical analysis be performed to establish precise mitigation measures with respect to Cumulative (2015) + Project traffic noise exposure on the project site when a project design, tentative map, and architectural drawings are available.

Impact 2: **Increase in Existing Traffic Noise Levels:** The project will generate increased traffic on existing local area roadways. As shown in Table 4 above, project-related traffic noise increases relative to existing levels on L Street between Covell Boulevard and 8th Street are expected to be 3+ dB. This exceeds the significance criterion established for this project. **Therefore, this impact is considered to be significant.**

Mitigation 2: The following construction may be considered to mitigate project-related traffic noise exposure increases at existing noise-sensitive receiver locations. The construction of property-line noise barriers in this instance is not feasible since homes along this section of L Street front the roadway and require driveway access.

Evaluation of Rubberized Asphalt Mitigation Measure Effectiveness:

One of the means of reducing overall noise levels along L Street is to use a rubberized asphalt pavement or open gap pavement. Studies conducted for the Sacramento County Department of Environmental Review and Assessment and Transportation Department to determine the noise reduction provided by rubberized asphalt have been completed in recent years. Those studies indicate that the use of rubberized asphalt on Sacramento County roadways appears to have resulted in an average traffic noise level reduction of approximately 4 dB over that provided by conventional asphalt.

The European Commission Green Paper, published in the June 1997 edition of Noise/News International, cites the following on Page 87:

ALow-noise porous road surfaces have been the subject of much research. These porous road surfaces reduce both the generation and propagation of noise by several mechanisms - which can be related to the open structure of the surface layer. Results have shown that the emission noise levels can be reduced from levels generated on equivalent non-porous road surfaces by between 3-5 dB on average; by optimizing the surface design, larger noise reductions are feasible. At present, the cost of porous asphalt surfacing is higher than conventional surfaces (for resurfacing, but for new roads, the cost is minimal), but may drop as contractors gain experience with porous surfaces.@

The use of noise-reducing paving materials for L Street closest to the project appears to be a feasible means of achieving a 3-5 dB decrease in traffic noise and reducing the potential for adverse public reaction to future traffic noise levels along the corridor, and reducing traffic noise impacts to a less than significant level.

Impact 3: **Cumulative Increase in Traffic Noise Levels:** The project will contribute to cumulative traffic on the local roadway network. Project-related traffic noise increases in the project vicinity, relative to Cumulative (2015) no project noise levels, are not expected to exceed the 3 dB criterion, as shown in Table 4. **Therefore, this impact is considered to be less than significant.**

Mitigation 3: None Required.

Impact 4: **Union Pacific Railroad Noise Levels on the Project Site:** As described above, existing (and expected future) operations on the UPRR are not expected to exceed 54 dB L_{dn} at the closest locations of outdoor activity areas on the project site. This level does not exceed the established 60 dB L_{dn} exterior noise criterion. **Therefore, this impact is considered to be less than significant.**

Mitigation 4: None Required.

Impact 5: **Blue Max Kart Club Noise Levels on the Project Site:** As described above, average existing (and expected future) noise exposure from the Blue Max Kart Club is expected to be approximately 62 dB L_{dn} at the closest proposed locations of outdoor activity areas on the project site. This level exceeds the established 60 dB L_{dn} exterior noise criterion. In addition, it is expected that worst-case noise activities at the facility will be much higher than measured. **Therefore, this impact is considered to be significant.**

Mitigation 5: The following measures may be used to mitigate traffic noise exposure at future residences (outdoor activity areas) on the project site.

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The Rule-of-thumb is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively.

Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is the basis for calculating barrier noise reduction.

Barrier effectiveness depends on the relative heights of the source, barrier, and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

To provide the 16 dB of noise level reduction required to meet the City's daytime Noise Ordinance criterion, Bollard & Brennan, Inc. estimates that a property line noise barrier of no less than approximately 12 feet in height would be required.

Due to the many variables which need to be considered for determining the effectiveness of a barrier, a detailed acoustical analysis should be conducted by a qualified acoustical consultant.

Site Design, Building Locations, and Building Orientations

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment.

Detailed Acoustical Analysis

Bollard & Brennan, Inc. recommends that a detailed acoustical analysis be performed to establish precise mitigation measures with respect to worst-case Blue Max Kart Club activities on the project site.

Impact 6: **Construction Noise:** Activities associated with the project construction will result in elevated noise levels, with maximum noise levels ranging from 85-88 dB at 50 feet, as shown in Table 5. Although these levels would be audible at the nearest existing residences, they would be temporary in nature and would likely occur during normal daytime working hours. Nonetheless, because construction activities would result in periods of elevated noise levels, **this impact is considered to be potentially significant.**

Mitigation 6: Implementation of the following noise mitigation measures would reduce this impact to a less than significant level.

All construction activities should adhere to the construction practices established by the City of Davis, including limiting construction activities to the daytime hours, and requiring all internal combustion engines to be fitted with factory specified mufflers.

IMPACTS AND MITIGATION MEASURES B HIGH DENSITY ALTERNATIVE

Again, as described above, the High Density alternative to the Proposed Project will include an additional 343 single-family units and 317 co-housing units. This alternative would eliminate the “senior only” home sites and hospice facility.

Analysis:

Off-Site Noise Impact Assessment:

The identified noise-producing elements included in this project are increased traffic noise on the local roadway network and project-related construction. This analysis focuses on these noise sources.

Traffic Noise Impact Assessment:

To assess noise impacts due to project-related traffic increases on the local roadway network, traffic noise levels are predicted at a representative distance (75 feet from the roadway centerline) for the Existing + High Density alternative and Cumulative (2015) + High Density alternative conditions. The traffic noise levels were predicted using the same modeling methodology described in the Setting Section. Predicted traffic noise levels are presented in Table 6.

Construction Noise Impact Assessment:

It is not expected that construction noise for the High Density alternative of the Proposed Project will be any different than discussed above for the Proposed Project scenario.

On-Site Noise Impact Assessment:

Traffic Noise Impact Assessment:

As shown in Table 6, unmitigated Cumulative (2015) + High Density alternative traffic noise exposure on the project site is expected to exceed 60 dB L_{dn} at all of the project perimeter roadways. Traffic noise on the project site may be mitigated using appropriate project setbacks, property line noise barriers, and/or appropriate project building orientation and layout.

To provide the noise level reduction required to meet the City's exterior Noise Element criterion, Bollard & Brennan, Inc. estimates that property line noise barriers of approximately 6-9 feet in height would be required.

Bollard & Brennan, Inc. recommends that a detailed traffic noise analysis be performed for the project site once a specific site design has been determined.

TABLE 6

**PREDICTED TRAFFIC NOISE LEVELS AT 75 FEET FROM ROADWAY CENTERLINES
COVELL VILLAGE B DAVIS, CALIFORNIA**

Roadway	Segment	L _{dn} , dB (change, dB)	
		Existing +HD Alt.	Cumulative (2015) + HD Alt.
Covell Blvd.	W. of F Street	65.1 (+1.3)	65.9 (+1.0)
Covell Blvd.	F Street – J Street	66.0 (+1.9)	66.9 (+1.3)
Covell Blvd.	J Street – L Street	66.2 (+2.2)	67.0 (+1.6)
Covell Blvd.	L Street – Pole Line Rd.	65.5 (+1.6)	66.5 (+1.1)
Covell Blvd.	E. of Pole Line Rd.	63.7 (+1.3)	65.1 (+0.8)
Pole Line Rd.	N. of Covell Village Rd.	64.4 (NA)	65.6 (NA)
Pole Line Rd.	Covell Village Rd. – Moore Ave.	65.1 (+1.6)	65.9 (+1.2)
Pole Line Rd.	Moore Ave. – Donner Ave.	66.9 (+2.5)	67.7 (+1.8)
Pole Line Rd.	Donner Ave. – Picasso Ave.	67.7 (+2.8)	68.4 (+2.0)
Pole Line Rd.	Picasso Ave. – Covell Blvd.	68.4 (+2.5)	69.0 (+1.9)
Pole Line Rd.	S. of Covell Blvd.	66.8 (+1.8)	67.7 (+1.3)
F Street	N. of Covell Blvd.	61.9 (+0.8)	62.7 (+0.8)
F Street	S. of Covell Blvd.	63.3 (+1.0)	64.0 (+0.7)
J Street	S. of Covell Blvd.	58.6 (+1.9)	59.4 (+1.0)
L Street	Covell Blvd. – Drexel Dr.	60.1 (+3.8)	60.3 (+3.2)
L Street	Drexel Dr. – 8 th Street	60.3 (+3.5)	60.9 (+2.6)
L Street	S. of 8 th Street	61.0 (+2.6)	61.0 (+2.6)
Moore Blvd.	E. of Pole Line Rd.	57.7 (+1.5)	59.5 (+0.9)
Donner Ave.	E. of Pole Line Rd.	54.4 (+0.7)	54.6 (+0.7)
Picasso Ave.	E. of Pole Line Rd.	57.2 (+1.2)	57.3 (+1.2)

Source: FHWA-RD-77-108 with inputs from Fehr & Peers and Bollard & Brennan, Inc.

Union Pacific Railroad Noise Impact Assessment:

Railroad noise impacts for the High Density project alternative are the same as for the Propose Project scenario.

Blue Max Kart Club:

Blue Max Kart Club noise impacts for the High Density project alternative are the same as for the Propose Project scenario.

SPECIFIC IMPACTS AND MITIGATION STATEMENTS B HIGH DENSITY ALTERNATIVE

Impact 1: **Impacts of Off-Site Traffic on On-Site Noise-Sensitive Uses:** The project site is located immediate adjacent to F Street, Covell Boulevard, and Pole Line Road. As presented above, Cumulative (2015) + High Density traffic noise exposure on the project site may be as high as 69 dB L_{dn} , exceeding the 60 dB L_{dn} exterior noise criterion. Additionally, Cumulative (2015) + High Density traffic noise exposure levels may exceed the 45 dB L_{dn} interior noise standard within proposed dwellings. **Therefore, this impact is considered to be significant.**

Mitigation 1: The following measures may be used to mitigate traffic noise exposure at future residences (outdoor activity areas) on the project site.

Use of Setbacks

Noise exposure may be reduced by increasing the distance between the noise source and receiving use. Setbacks can take the form of open space, frontage roads, recreational areas, etc. The available noise attenuation from this technique is limited by the characteristics of the noise source, but is generally 3 to 6 dB per doubling of distance from the source. The Arule-of-thumb@ is that most traffic and railroad noise levels will decrease or increase by approximately 4.5 dB per doubling, or halving of distance, respectively.

Use of Barriers

Shielding by barriers can be obtained by placing walls, berms or other structures, such as buildings, between the noise source and the receiver. In addition, intervening topography can be an effective barrier for noise control. The effectiveness of a barrier depends upon blocking line-of-sight between the source and receiver, and is improved with increases in distance the sound must travel to pass over the barrier as compared to a straight line from source to receiver. The difference between the distance over a barrier and a straight line between source and receiver is called the "path length difference," and is

the basis for calculating barrier noise reduction.

Barrier effectiveness depends on the relative heights of the source, barrier, and receiver. In general, barriers are most effective when placed close to either the receiver or the source. An intermediate barrier location yields a smaller path length difference for a given increase in barrier height than does a location closer to either source or receiver.

To provide the noise level reduction required to meet the City's exterior Noise Element criterion, Bollard & Brennan, Inc. estimates that property line noise barriers of approximately 6-9 feet in height would be required.

Due to the many variables which need to be considered for determining the effectiveness of a barrier, a detailed acoustical analysis should be conducted by a qualified acoustical consultant.

Site Design, Building Locations, and Building Orientations

Buildings can be placed on a project site to shield other structures or areas, to remove them from noise-impacted areas, and to prevent an increase in noise levels caused by reflections. As an example, carports or garages can be used to form or complement a barrier, or shield an outdoor activity area. Placement of outdoor activity areas on the opposite side of the building facades from the noise source, or within the shielded portion of a building complex, such as a central courtyard, can also be an effective method of providing a quiet retreat in an otherwise noisy environment.

Building Design and Construction Improvements

Proposed project buildings closest to the perimeter noise sources may be designed to minimize exterior-to-interior noise transmission, thus minimizing interior noise exposure, by 1) limiting the area of acoustically weak building elements (i.e., windows and doors) in the exterior building façade design, and 2) providing acoustically rated windows and doors at the most highly noise impacted building façades.

Detailed Acoustical Analysis

Bollard & Brennan, Inc. recommends that a detailed acoustical analysis be performed to establish precise mitigation measures with respect to Cumulative (2015) + Project traffic noise exposure on the project site.

Impact 2: **Increase in Existing Traffic Noise Levels:** The project will generate increased traffic on existing local area roadways. As shown in Table 6 above, project-related traffic noise increases relative to existing levels on L Street between Covell Boulevard and 8th Street are expected to be 3+ dB. This exceeds the significance criterion established for this project. **Therefore, this impact is considered to be significant.**

Mitigation 2: The following construction may be considered to mitigate project-related traffic noise exposure increases at existing noise-sensitive receiver locations. The construction of property-line noise barriers in this instance is not feasible since homes along this section of L Street front the roadway and require driveway access.

Evaluation of Rubberized Asphalt Mitigation Measure Effectiveness:

One of the means of reducing overall noise levels along L Street is to use a rubberized asphalt pavement or open gap pavement. Studies conducted for the Sacramento County Department of Environmental Review and Assessment and Transportation Department to determine the noise reduction provided by rubberized asphalt have been completed in recent years. Those studies indicate that the use of rubberized asphalt on Sacramento County roadways appears to have resulted in an average traffic noise level reduction of approximately 4 dB over that provided by conventional asphalt.

The European Commission Green Paper, published in the June 1997 edition of Noise/News International, cites the following on Page 87:

ALow-noise porous road surfaces have been the subject of much research. These porous road surfaces reduce both the generation and propagation of noise by several mechanisms - which can be related to the open structure of the surface layer. Results have shown that the emission noise levels can be reduced from levels generated on equivalent non-porous road surfaces by between 3-5 dB on average; by optimizing the surface design, larger noise

reductions are feasible. At present, the cost of porous asphalt surfacing is higher than conventional surfaces (for resurfacing, but for new roads, the cost is minimal), but may drop as contractors gain experience with porous surfaces.@

The use of noise-reducing paving materials for L Street closest to the project appears to be a feasible means of achieving a 3-5 dB decrease in traffic noise and reducing the potential for adverse public reaction to future traffic noise levels along the corridor, and reducing traffic noise impacts to a less than significant level.

Impact 3: **Cumulative Increase in Traffic Noise Levels:** The project will generate increased traffic on existing local area roadways. As shown in Table 6 above, the project-related traffic noise increase relative to the Cumulative (2015) level on L Street between Covell Boulevard and Drexel Drive is expected to be 3+ dB. This exceeds the significance criterion established for this project. **Therefore, this impact is considered to be significant.**

Mitigation 3: Please see the discussion for Mitigation 2.

Mitigation measures 4-6 for the Proposed Project apply to the High Density project alternative.