

APPENDIX 8

Noise Impact Analysis

NOISE IMPACT ANALYSIS
VISTA NUEVO
COUNTY OF RIVERSIDE, CALIFORNIA

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Date:

November 15, 2014

Project No.: P14-047 N

RIVERSIDE COUNTY NOISE STANDARDS

In the Noise Element of the Riverside County General Plan, the County uses the State of California Office of Noise Control guidelines to specify a range of community noise exposure levels which are considered acceptable for various receiver site land uses, as seen in Table 1. The Noise Element of the Riverside County General Plan states that an exterior noise exposure standard of 60 dB CNEL is the most desirable level for single-family residential uses while levels of 65 dB CNEL are desirable for usable outdoor space (patios, decks, pools, etc.) for multi-family developments. A level of 70 dB CNEL is considered “conditionally acceptable” for all residential uses. In a “conditionally acceptable” noise category, new construction should be undertaken only after a noise analysis has been made and needed noise insulation features have been incorporated.

According a memorandum issued by the Riverside County Public Health Department on November 23, 2009 by Steve Hinde, Senior Industrial Hygienist, the following direction for noise analysis is provided:

1. To avoid future noise hazard, the maximum capacity design standard for highways and major roads shall be used for determining the maximum future noise level or, in the case of freeways and airports, the estimated conditions 20 years in the future may be used.
2. The interior noise levels in residential dwellings shall not exceed 45 Ldn/CNEL in habitable rooms.
3. The exterior noise level shall not exceed 65 Ldn/CNEL in usable outdoor space.

In areas of exterior noise levels up to 65 dB CNEL, the residential interior standard of 45 dB CNEL is readily achieved with single pane closed windows and mechanical ventilation. Double paned closed windows offer 25-30 dB CNEL exterior to interior noise attenuation and allow for an exterior noise loading of 70-75 dB CNEL. Use of dual paned windows is a standard building code requirement for residential development under the CalGREEN initiative. In areas of higher noise exposure, typical perimeter walls generally achieve 6-8 dB of noise level reduction. If necessary, a small amount of additional attenuation (increased set-back, partial structural screening, grade separation) may be necessary. Exterior noise levels of 70-75 dB CNEL can thus normally be mitigated to within General Plan/Building Code standards for noise-sensitive land uses.

Table 1
Riverside County Land Use Compatibility Chart
for Community Noise

Land Uses	CNEL or Ldn Value (dBA)								
	50	55	60	65	70	75	80	85	
Residential-Low Density, Single-Family, Duplex, Mobile Homes	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Residential-Multiple Family	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Transient Lodging: Hotels, Motels	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Schools, Libraries, Churches, Hospitals, Nursing Homes	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Auditoriums, Concert Halls, Amphitheaters	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Sports Arena, Outdoor Spectator Sports	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Playgrounds, Neighborhood Parks	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Golf Courses, Riding Stables, Water Recreation, Cemeteries	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Office Buildings, Business, Commercial, and Professional	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable
Industrial, Manufacturing Utilities, Agriculture	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable	Normally Unacceptable

Legend:



Normally Acceptable: Specified land use as satisfactory based upon the assumption that any buildings involved are of normal environmental construction, without any special noise insulation requirements.



Conditionally Acceptable: New construction or development should be undertaken only after a detailed analysis of the noise reduction requirement is made and needed noise insulation features included in the design. Conventional construction, but with closed windows and fresh air supply systems or air conditioning will normally suffice. Outdoor environment will seem noisy.



Normally Unacceptable: New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made with needed noise insulation features included in the design. Outdoor area must be shielded.



Clearly Unacceptable: New construction or development should generally not be undertaken. Construction costs to make the indoor environment acceptable would be prohibitive and the outdoor environment would not be usable.

The Riverside County standards presented in Table 1 are used by planners to evaluate the suitability of a given existing or proposed land-use relative to its noise exposure. If noise levels are anticipated to exceed these guidelines, noise mitigation must be evaluated and implemented where feasible before any land-use actions can be approved. The guidelines in Table 1 are mainly advisory, except near airports, where state law restricts construction of noise-sensitive uses in a high noise area except under unusual circumstances. They apply mainly to transportation activity (vehicles, trains, planes, etc.) noise impacts on adjacent land use. These guidelines are used in land-use decisions because noise control from transportation is controlled by state or federal agencies and is not locally regulated.

While the Noise Element guidelines apply to mobile transportation noise sources, stationary equipment noise crossing the boundary of adjoining uses is generally regulated by local noise standards because no state or federal pre-emption exists for such sources. For stationary noise sources located proximate to residential uses, Riverside County has adopted a noise exposure planning policy contained in Chapter 7 of the General Plan, Table N-2:

Stationary Source Land Use Exterior Noise Standards	
7 a.m. – 10 p.m.	65 dB Leq (10 minute)
10 p.m. – 7 a.m.	45 dB Leq (10 minute)

A passive residential use such as the proposed project is not anticipated to create any substantive stationary source noise that would require evaluation.

Construction activity noise is restricted by ordinance to occur during hours of lesser sensitivity. In addition, grading permits require use of properly operating mufflers on all combustion equipment. Materials stockpiling and equipment and vehicle staging areas are also encouraged to be placed as far away from existing homes as is reasonably feasible.

EXISTING NOISE LEVELS

The project is located in unincorporated Riverside County. Existing noise levels throughout the project area derive almost exclusively from vehicular sources on the area roadways. The proposed residential project site is vacant and undeveloped. The proposed Vista Nueva residential development is bound by Nuevo Road to the north and residential uses across Nuevo Road. There is vacant land zoned for residential uses to the east and south with existing residential uses west of the project site. With area-wide development, the existing quiet noise character is likely to change dramatically.

Existing on-site traffic noise derives mainly from traffic on Nuevo Road. Existing traffic volumes on Nuevo Road are 4,100 ADT (RK Engineering, 2014). The estimated traffic noise at 50 feet from the Nuevo Road centerline is approximately 64 dB CNEL in the project vicinity. This is only slightly less than the residential siting standard of 65 dB CNEL. With anticipated area growth, the need for mitigation such as noise walls near Nuevo Road will increase substantially.

NOISE IMPACTS

Two characteristic noise sources are typically identified with land use intensification such as that proposed for the Vista Nuevo residential development. Initially, project construction activities, especially from heavy equipment, will create short-term noise increases near the project site. Such impacts may be important if there is phased development and one phase is under construction adjacent to an already completed and occupied phase.

Upon completion, project-related traffic will cause an incremental increase in area-wide noise levels throughout the Nuevo/Lakeview area. Traffic noise impacts are generally analyzed both to insure that the project will not adversely impact the acoustic environment of the surrounding community, as well as to insure that the project site is not exposed to an unacceptable level of noise resulting from the ambient noise environment acting upon the project. Needed buffer distances and propagation barriers must be evaluated to minimize the impact potential where such impacts exceed established impact significance thresholds. Typically, project-related, off-site noise impacts are evaluated as part of area-wide (community plan or specific plan) development planning. The focus of this report, therefore, is the impact of the noise environment upon the project, and not the project upon regional noise patterns.

NOISE SIGNIFICANCE CRITERIA

Noise impacts are considered significant if they result in:

- a. 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.
- b. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
- d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

"Substantial" is not defined in any guidelines. A change of ± 1 dB or less is not detectable by people even in a laboratory environment. Under ambient conditions, people cannot clearly distinguish changes in noise levels until they reach +3 dB (20 to 25 percent louder than before) when they occur over time. A measurable increase (characterized by a +3 dB increase), however, requires a 100 percent increase in traffic volumes because of the logarithmic nature of the decibel scale. Very few projects of themselves cause traffic volumes to double on streets already carrying enough traffic to experience a substantial existing noise problem. Use of a +3 dB "perceptible" change in noise levels as an impact significance criterion generally leads to impacts that are cumulatively potentially significant from all the forecast growth, but rarely on a

project-specific basis. Nevertheless, a +3 dB is the generally accepted traffic noise impact significance threshold.

CONSTRUCTION NOISE IMPACTS

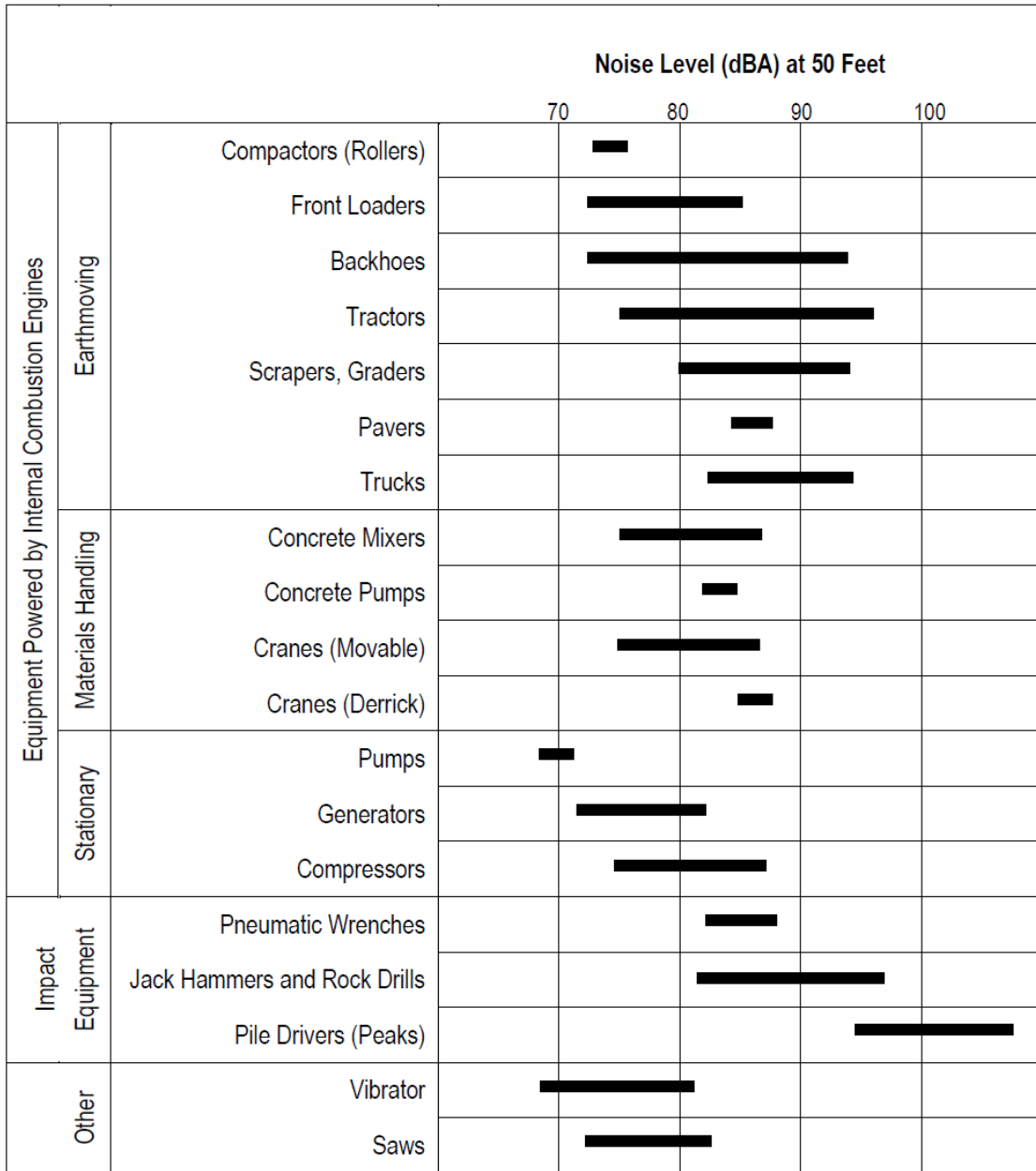
Temporary construction noise impacts vary markedly because the noise strength of construction equipment ranges widely as a function of the equipment used and its activity level. Short-term construction noise impacts tend to occur in discrete phases dominated initially by earth-moving sources, then by foundation and roadway paving, and finally for finish construction.

Figure 1 shows the typical range of construction activity noise generation as a function of equipment used in various building phases. The earth-moving sources are seen to be the noisiest with equipment noise ranging up to about 90 dB (A) at 50 feet from the source. Spherically radiating point sources of noise emissions are atmospherically attenuated by a factor of 6 dB per doubling of distance, or about 20 dB in 500 feet of propagation. The loudest earth-moving noise sources will therefore sometimes be detectable above the local background beyond 1,000 feet from the construction area. An impact radius of 1,000 feet or more pre-supposes a clear line-of-sight and no other machinery or equipment noise that would mask project construction noise. With buildings and other topographical barriers to interrupt line-of-sight conditions, the potential “noise envelope” around individual construction sites is reduced. Construction noise impacts are, therefore, somewhat less than that predicted under idealized input conditions.

Noise impacts would be significant if they caused a violation of any adopted standards. There are no specific performance standards in the Riverside County Code that apply to construction. Construction noise impacts are minimized by time restrictions placed on grading permits. Ordinance 457.90, Section 1G of the Riverside County Building and Safety Department, states the following:

Whenever a construction site is within one-quarter (1/4) mile of an occupied residence(s), no construction activities shall be undertaken between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September and between the hours of 6:00 p.m. and 7:00 a.m. during the months of October through May.

Figure 1
Typical Construction Equipment Noise Generation Levels



Source: EPA PB 206717, Environmental Protection Agency, December 31, 1971, "Noise from Construction Equipment and Operations."

Construction noise is unavoidable and sensitive land uses adjacent to the project site could potentially be impacted during construction activity. These impacts would be temporary and limited to the duration of the construction in any one location. However, these temporary impacts will cease once each project component is completed. The project is planned to be constructed in a single phase.

Although construction related noise impacts are predicted to be less than significant, the following mitigation measures should be incorporated into the project contract specifications to minimize noise nuisance impacts:

Recommended Construction-Related Mitigation Measures:

MM Noise 1: Compliance with construction time limits of Riverside County Ordinance No. 457, Section 1G that prohibits construction activities between the hours of 6 p.m. and 6 a.m. during the months of June through September, and between 6 p.m. and 7 a.m. during the months of October through May.

MM Noise 2: All construction equipment shall be required to minimize noise from construction activities. Equipment mufflers shall be maintained in proper operating order. All equipment shall be operated in the quietest manner feasible.

MM Noise 3: To the extent feasible, the noisiest operations shall be scheduled to occur simultaneously in the construction program to avoid prolonged periods of annoyance.

MM Noise 4: The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise sensitive receptors nearest the project site during all project construction.

MM Noise 5: No music or electronically reinforced speech from construction workers shall be audible at noise-sensitive property.

MM Noise 6: All project workers exposed to noise levels above 80 dBA shall be provided with personal protective equipment for hearing protection (i.e., earplugs and/or earmuffs); areas where noise levels are routinely expected to exceed 80 dBA shall be clearly posted with signs requiring hearing protection be worn.

CONSTRUCTION ACTIVITY VIBRATION

Construction activities generate ground-borne vibration when heavy equipment travels over unpaved surfaces or when it is engaged in soil movement. The effects of ground-borne vibration include discernable movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Within the “soft” sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Because vibration is typically not an issue, very few jurisdictions have adopted vibration significance thresholds. Vibration thresholds have been adopted for major public works construction projects, but these relate mostly to structural protection (cracking foundations or stucco) rather than to human annoyance.

Vibration is most commonly expressed in terms of the root mean square (RMS) velocity of a vibrating object when considering vibration annoyance potential. RMS velocities are expressed in units of vibration decibels. The range of vibration decibels (VdB) is as follows:

65 VdB	-	threshold of human perception
72 VdB	-	annoyance due to frequent events
80 VdB	-	annoyance due to infrequent events
100 VdB	-	minor cosmetic damage

To determine potential impacts of the project’s construction activities, estimates of vibration levels induced by the construction equipment at various distances are presented in Table 3.

Table 3

Equipment	Approximate Vibration Levels (VdB)*				
	25 feet	50 feet	100 feet	350 feet	1000 feet
Large Bulldozer	87	81	75	64	55
Loaded Truck	86	80	74	63	54
Jackhammer	79	73	67	56	47
Small Bulldozer	58	52	46	35	26
Pile Driver	93	87	81	70	61

* (FTA Transit Noise & Vibration Assessment, Chapter 12, Construction, May, 2006)

The on-site construction equipment that will create the maximum potential vibration is a large bulldozer or loaded truck. The stated vibration source level in the FTA Handbook for such equipment is 81 VdB at 50 feet from the source. The nearest residential structures to the project site are at least 100 feet from the nearest site perimeter and heavy equipment activity. The majority of project equipment will operate at much greater separation distances. Vibration levels from heavy equipment could be as high as 75 VdB at the closest existing residences which although could be perceptible, is well below any damage thresholds. Construction activity vibration impacts are judged as less-than-significant.

VEHICULAR NOISE IMPACTS

Long-term noise concerns from the increase of residential uses at the project site are primarily based on vehicular operations on project area roadways. These concerns were addressed using the California specific vehicle noise curves (CALVENO) in the federal roadway noise model (the FHWA Highway Traffic Noise Prediction Model, FHWA-RD-77-108). The model calculates the Leq noise level for a reference set of input conditions, and then makes a series of adjustments for site-specific traffic volumes, distances, speeds, or noise barriers.

Table 2 summarizes the calculated 24-hour CNEL level at 50 feet from the roadway centerline along project adjacent roadway segments. Two time frames were evaluated; existing conditions with and without project, and future conditions with and without project. The noise analysis for these scenarios utilized data from the project traffic analysis, prepared by RK Engineering Group in 2014 for this project.

A “significant” traffic noise impact would occur if project-related traffic were to increase noise levels by +3 dB or more. As seen in Table 3, the largest project related impact is +2.9 dB CNEL on North Drive, north of Nuevo Road. North Road is currently very lightly utilized and therefore even a small increase in vehicular use causes a relatively large impact. However, the “future with project” noise levels on North Road are not expected to exceed even 60 dB CNEL at 50 feet from roadway centerline. By 2019, at project build-out, background traffic noise levels are expected to increase and dilute the project impact. In 2019, the project contribution to traffic noise decreases to +1.6 dB CNEL. Therefore, the project related traffic noise impact is considered to be less than significant.

Table 2
Traffic Noise Impact Analysis
CNEL in dB at 50 feet from Centerline

Roadway Segment	Existing	Existing	Existing + Project	2019	2019 + Project
Nuevo Rd/	Gibson Ave-North Dr	63.0	63.8	64.1	64.7
	North Drive-Sky Dr	64.0	65.1	65.4	66.2
	Sky Dr-Lake View	63.9	64.6	64.8	65.4
	Lake View Ave-Ramona Ave	67.4	68.0	68.4	68.9
	Ramona Ave-Menifee Rd	67.1	67.7	68.1	68.6
	W of Menifee	66.5	66.5	67.4	67.4
	E of Dunlap	67.0	67.3	67.7	67.9
	Dunlap Dr-Evans Rd	67.5	67.5	67.9	67.9
	Evans Rd-Redlands Ave	69.9	70.1	70.5	70.8
	W of Redlands Ave	69.9	70.1	70.5	70.7
North Drive/	N of Nuevo	54.8	57.7	58.3	59.9
	S of Ramona Expressway	63.9	64.5	64.8	65.3
Lake View Ave/	N of Nuevo	65.4	65.4	65.8	65.8
Ramona Ave/	S of Nuevo	57.4	57.8	58.6	59.0
Menifee Rd/	Nuevo-Central	66.4	66.5	66.9	67.1
	Central-San Jacinto Ave	66.8	67.3	67.7	68.1
	S of San Jacinto	66.4	66.7	67.1	67.3
Dunlap Dr/	S of Nuevo	53.9	53.9	53.9	53.9
	N of Nuevo	62.5	62.5	62.9	62.9
Evans Rd/	N of Nuevo	64.9	64.9	65.3	65.3
Redlands Ave/	S of Nuevo	67.8	68.0	68.4	68.5
	N of Nuevo	65.8	65.8	66.2	66.2

Table 3
Project Noise Impact Analysis
CNEL in dB at 50 feet from Centerline

Roadway Segment	Existing	Project Only Existing	Project Only 2019
Nuevo Rd/	Gibson Ave-North Dr	0.7	0.6
	North Drive-Sky Dr	1.1	0.8
	Sky Dr-Lake View	0.7	0.6
	Lake View Ave-Ramona Ave	0.6	0.5
	Ramona Ave-Menifee Rd	0.6	0.5
	W of Menifee	0.0	0.0
	E of Dunlap	0.3	0.3
	Dunlap Dr-Evans Rd	0.0	0.0
	Evans Rd-Redlands Ave	0.3	0.3
	W of Redlands Ave	0.2	0.2
North Drive/	N of Nuevo	2.9	1.6
	S of Ramona Expressway	0.6	0.5
Lake View Ave/	N of Nuevo	0.0	0.0
Ramona Ave/	S of Nuevo	0.5	0.3
Menifee Rd/	Nuevo-Central	0.2	0.2
	Central-San Jacinto Ave	0.5	0.4
	S of San Jacinto	0.3	0.3
Dunlap Dr/	S of Nuevo	0.0	0.0
	N of Nuevo	0.0	0.0
Evans Rd/	N of Nuevo	0.0	0.0
Redlands Ave/	S of Nuevo	0.1	0.1
	N of Nuevo	0.0	0.0

NOISE STANDARD COMPLIANCE

The exterior noise standard for single family exterior recreational uses is 65 dBA CNEL in usable outdoor space such as backyards, decks, patios, etc. If required, attenuation through setback and project perimeter barriers is anticipated to be used to reduce traffic noise to the 65 dBA CNEL goal. An inability to achieve this goal through the application of reasonably available mitigation measures would be considered a significant impact.

Homes along the northern site perimeter will be subject to traffic noise from Nuevo Road. Riverside County noise assessment guidelines for unincorporated areas recommend use of default vehicle distributions representative of the county. Noise impacts and mitigation are analyzed for general plan roadway design levels rather than upon project specific traffic forecasts. Nuevo Road in the project vicinity is treated as a major roadway for this analysis. Specific roadway input conditions included:

Roadways	Classification	LOS=C ADT
Nuevo Road	Major	27,300

Noise impacts from traffic associated with anticipated development were evaluated using traffic mix/speed/day-night assumptions provided by Riverside County staff (1998) for major roadways. As per County guidelines, the roadways designated as arterial highways, major roadways or expressways, have the following required traffic distributions (%):

Vehicle	Overall	Day (7 a.m.–7 p.m.)	Evening (7 p.m.–10 p.m.)	Night (10 p.m.-7 a.m.)
Auto	92	69.5	12.9	9.6
Medium trucks	3	1.44	0.06	1.5
Heavy trucks	5	2.4	0.1	2.5

Using the FHWA federal highway transportation noise model, combined with County guidelines, the noise level at 50 feet from the centerline of a major roadway is as shown below:

**Noise Impact Analysis
Major Highway (27,300 ADT – 40 mph)
(dBA CNEL at 50 feet from centerline)**

Type	Day	Evening	Night	CNEL
Auto	67.99	66.69	60.64	69.79
Medium Trucks	60.05	52.27	61.48	67.66
Heavy Trucks	67.07	59.28	68.50	74.69
TOTAL	70.93	67.55	69.84	76.49

Therefore, the predicted traffic noise from Nuevo Road of 76.5 dB CNEL at 50 feet from the roadway centerline was used to evaluate noise impact.

A 300 foot setback from the centerline of a major roadway is needed to achieve a 65 dB CNEL noise level. If this setback cannot be achieved then a combination of mitigation measures can be employed to ensure that residential uses adjacent to Nuevo Road are not exposed to noise levels in excess of the 65 dB CNEL compatibility threshold.

If the indicated setbacks, as measured from roadway centerline were met, no additional mitigation would be necessary to achieve the 65 dB CNEL exterior threshold. However, if residential units were to be sited closer to the roadway than this distance, barriers (noise wall or a berm/wall combination) may be needed. Generally speaking, a 6-foot high wall would provide for 6 dB of noise reduction. There are substantial grade differences between building pads and roadway elevations along the Nuevo Road frontage. Grade separations can enhance the sound reduction benefit of any perimeter barriers, but will not eliminate their need.

A noise model was run to calculate wall height with the following input parameters per Riverside County guidelines:

Speed	40 mph
Receptor Height	Pad elevation + 5 feet, or Pad elevation + 3 feet if 6-foot wall proved insufficient for a 5-foot receptor height.
Propagation Condition	Acoustically “Hard”

While the traffic noise level along Nuevo Road is predicted to be as high as 76.5 dBA CNEL at 50 feet from the roadway centerline, because of the increased setback of the lots and intervening slope, actual on site noise exposure will be substantially less, though it will not negate the need for noise mitigation.

Due to varying terrain (slopes), source-receiver distances at the individual lots along Nuevo Road were measured from centerline to determine accurate distances for analysis purposes. A distance of +10 feet was added to signify a receiver at 10 feet inside the property line for exterior noise analysis. The lots abutting Nuevo Road typically have two setback distances; either 90 feet or 120 feet from centerline. A lot typical of each of these setback distances was evaluated. The table below indicates the analyzed lots fronting Nuevo Road, their elevation change from roadway grade and necessary wall height to meet the required 65 dB CNEL exterior noise level.

Lot	Lot Elevation	Roadway Elevation	Distance to Wall	Distance to Receiver	Wall Height Needed for 65 dB CNEL	
					5-ft Receiver	3-ft Receiver
8	643	638	90	100	7.5'	6.0'
4	640	635	120	130	6.0'	4.5'

A receiver height of 5 feet is initially assumed for a person standing 10 feet inside their rear lot line or at 10 feet inside “usable” outdoor space when slope is present. If a 6-foot high wall achieves the necessary noise level reduction needed to meet the 65 dBA CNEL standard, no further analysis is necessary. If a 6-foot high wall is insufficient, a less restrictive 3-foot high receiver height is assumed for a seated person, a toddler playing or a person using a pool or spa. The calculation process is carried forward until the minimum necessary wall height is calculated. A 6-foot wall with 3-foot receiver will meet the 65 dB CNEL exterior noise threshold for all homes along the Nuevo Road frontage.

An acoustical report is typically required for any noise sensitive development in an area of potentially excessive noise to document that adequate mitigation is included in project design. With the recommended perimeter walls, setback, or design strategies, it is anticipated that the recreational threshold of 65 dB CNEL can be met at all residential project lots exposed to General Plan build-out traffic noise levels at all homes abutting Nuevo Road.

INTERIOR NOISE COMPLIANCE

The County's exposure criteria for new residential construction require that the interior noise environment, attributable to outside sources, be limited to 45 dB CNEL. An interior CNEL of 45 dBA is mandated by the State of California Noise Insulation Standards (CCR, Title 24, Part 6, Section T25-28) for multiple-family dwellings and hotel and motel rooms. A 45 dBA CNEL is also typically considered the appropriate maximum interior noise exposure for single-family dwelling units.

Building facades were analyzed at within the property line as a worst-case scenario. Maximum theoretical noise loadings (based upon mandatory County traffic parameters) will be 73 dBA CNEL at second story building facades along the Nuevo Road frontage. First story facades will be noise protected by the recommended 6-foot perimeter wall.

Nuevo Road	Maximum Façade Exposure (dBA CNEL)	Maximum Needed Reduction (dBA)
Lot 8	73	-28
Lot 4	72	-27

Structural noise reduction of up to -28 dB will be needed to meet the 45 dBA CNEL interior standard in the Vista Nuevo residential development. For typical wood-frame construction with stucco and gypsum board wall assemblies, the noise level reduction is as follows:

- Partly open windows – 12 dBA
- Closed single-paned windows – 20 dBA
- Closed dual-paned windows – 30 dBA

Use of dual-paned windows is required by the California Building Code for energy conservation in new residential construction. Interior noise standards would therefore be met with only the use of closed dual-paned windows at the noisiest units. It is noted that where window closure is a requirement for interior noise control, the Building Code requires provision of supplemental ventilation at a specified rate with a specified fraction of fresh make-up air. The provision of supplemental ventilation is a standard construction practice.

A supplemental acoustical analysis should be submitted in conjunction with the issuance of building permits to verify that adequate structural noise protection exists in perimeter residences adjoining surrounding roadways to meet the 45 dBA CNEL interior standard. Supplemental ventilation, in conjunction with air conditioning, is required in any livable space where window closure to shut out roadway noise is needed to meet interior standards

NOISE MITIGATION SUMMARY

Exterior 6-foot perimeter walls built at the top of grade are needed along the Nuevo Road frontage to meet Riverside County exterior noise standards.

An interior noise analysis shall be submitted in conjunction with building plan check to verify that structural noise reduction will be achieved in possible second story livable space at the perimeter tier of homes by the specified structural components (windows, walls, doors, roof/ceiling assembly) shown on building plans. It is anticipated that standard dual paned windows will provide sufficient noise attenuation for all Nuevo Road adjacent residences.

All Nuevo Road perimeter homes shall have central air conditioning as a standard feature to allow for window closure during warmer weather while maintaining interior comfort. Supplemental ventilation is required for any habitable rooms facing Nuevo Road. Assuming a 5-person household, 75 cfm (5x15 cfm/person) of fresh make-up should be supplied to such rooms. The make-up air intake should be on the side of the house away from the adjacent arterial roadway.

The noise associated with traffic generated by the project is considered to be less-than-significant.

There are no specific performance standards in the County Code that apply to construction, and associated noise impacts are minimized by time restrictions placed on grading permits. Time constraints on construction involving heavy equipment use are established by Riverside County.

Riverside County Ordinance No. 457, Section 1G states the following:

Whenever a construction site is within one-quarter (1/4) mile of an occupied residence(s), No construction activities shall be undertaken between the hours of 6 p.m. and 6 a.m. during the months of June through September and between the hours of 6 p.m. and 7 a.m. during the months of October through May. Exceptions to these standards shall be allowed only with the written consent of the Riverside County Building Official.

With the incorporation of the following mitigation measures, the noise impact from construction will be less than significant:

MM Noise 1: Compliance with construction time limits of Riverside County Ordinance that prohibits construction activities between the hours of 6 p.m. and 6 a.m. during the months of June through September, and between 6 p.m. and 7 a.m. during the months of October through May.

MM Noise 2: All construction equipment shall be required to minimize noise from construction activities. Equipment mufflers shall be maintained in proper operating order. All equipment shall be operated in the quietest manner feasible.

MM Noise 3: To the extent feasible, the noisiest operations shall be scheduled to occur simultaneously in the construction program to avoid prolonged periods of annoyance.

MM Noise 4: The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise sensitive receptors nearest the project site during all project construction.

MM Noise 5: No music or electronically reinforced speech from construction workers shall be audible at noise-sensitive property.

MM Noise 6: All project workers exposed to noise levels above 80 dBA shall be provided with personal protective equipment for hearing protection (i.e., earplugs and/or earmuffs).

Appendix
Noise Modeling Results

Vista Nuevo Lot 8 5 ft Receiver

Target 24-hour CNEL	65
Distance to Receiver	100
Distance to Wall	90
Elevation Change	5
Height of Receiver	5
Hard or Soft Site	Hard
Req'd Height of Wall	7.5

50 ft Reference SPL

Type	Day	Evening	Night	CNEL
Auto	67.99	66.69	60.64	69.79
Medium Trucks	60.05	52.27	61.48	67.66
Heavy Trucks	67.07	59.28	68.5	74.69
	70.93	67.55	69.84	76.49

	Auto	Med Truck	Hvy Truck
Vehicle Height	0	2.3	8
Net Receiver Height	10	7.7	2
Net Wall Height	12.50	10.20	4.50
Direct LOS Height	9.00	6.93	1.80
Effective Wall Height	12.50	10.20	4.50

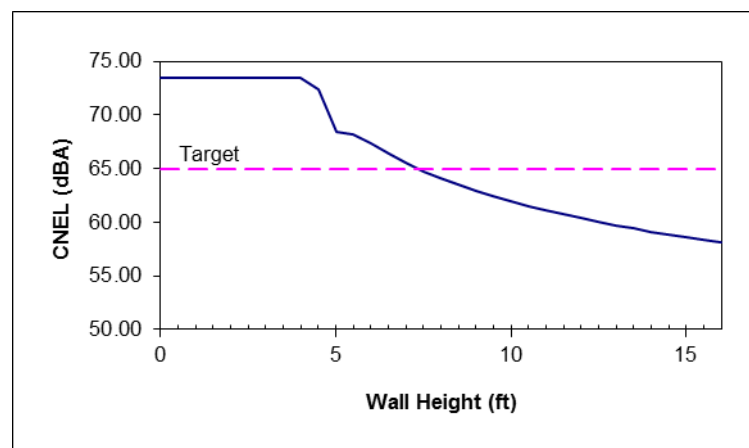
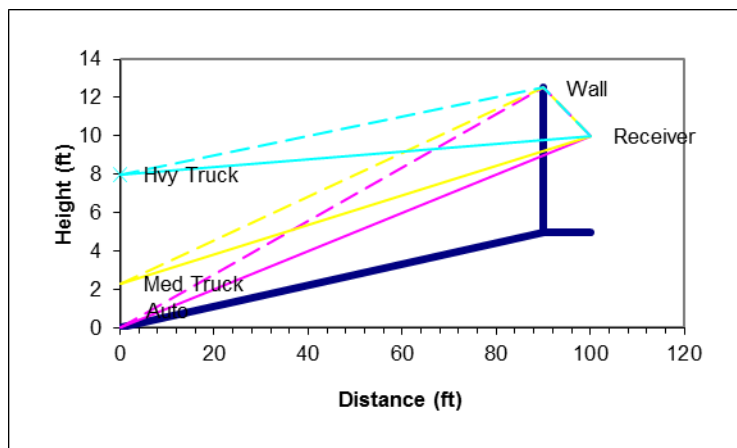
Attenuated SPL

Type	Day	Evening	Night	CNEL
Auto	64.96	63.66	57.61	66.76
Medium Trucks	57.03	49.25	58.46	64.64
Heavy Trucks	64.06	56.27	65.49	71.68
	67.91	64.52	66.83	73.50

Direct Distance (CD)	100.50	100.30	100.02
Indirect Distance (CI)	101.17	100.88	100.42
Difference (□)	0.673	0.588	0.400
Fresnel Adjusted	0.659	0.575	0.392
Reduction (NLR)	9.54	9.24	8.43

Resulting Noise Levels

	Auto	Medium Truck	Heavy Truck	24-hour CNEL
Total Attenuated Noise	57.22	55.40	63.25	64.75



Vista Nuevo Lot 8 3 ft Receiver

Target 24-hour CNEL	65
Distance to Receiver	100
Distance to Wall	90
Elevation Change	5
Height of Receiver	3
Hard or Soft Site	Hard
Req'd Height of Wall	6

50 ft Reference SPL

Type	Day	Evening	Night	CNEL
Auto	67.99	66.69	60.64	69.79
Medium Trucks	60.05	52.27	61.48	67.66
Heavy Trucks	67.07	59.28	68.5	74.69
	70.93	67.55	69.84	76.49

	Auto	Med Truck	Hvy Truck
Vehicle Height	0	2.3	8
Net Receiver Height	8	5.7	0
Net Wall Height	11.00	8.70	3.00
Direct LOS Height	7.20	5.13	0.00
Effective Wall Height	11.00	8.70	3.00

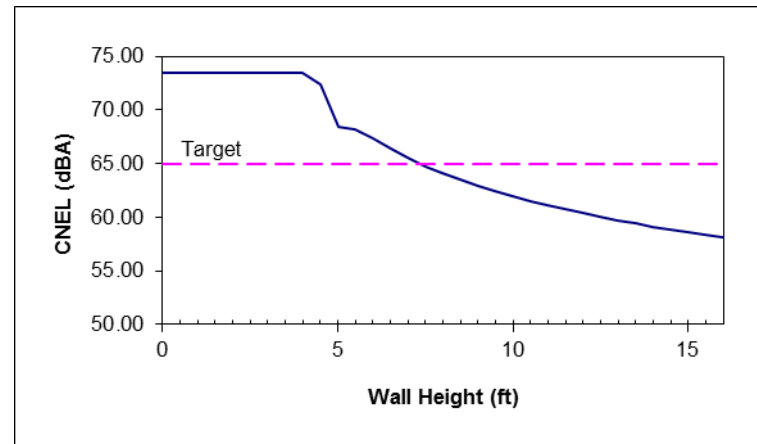
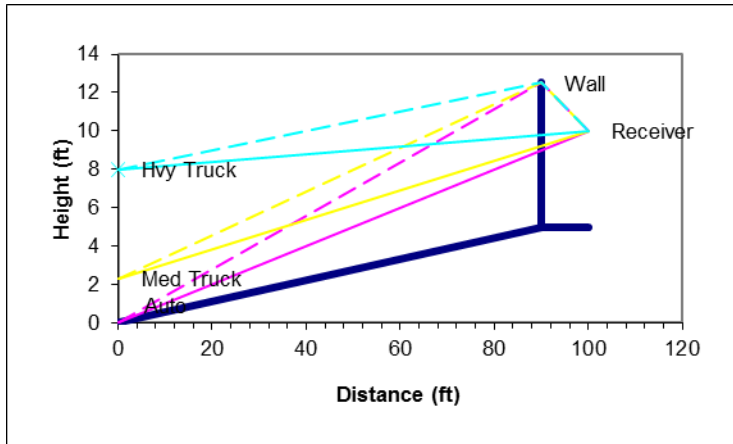
Attenuated SPL

Type	Day	Evening	Night	CNEL
Auto	64.97	63.67	57.62	66.77
Medium Trucks	57.03	49.25	58.46	64.64
Heavy Trucks	64.06	56.27	65.49	71.68
	67.92	64.52	66.83	73.50

	Auto	Med Truck	Hvy Truck
Direct Distance (CD)	100.32	100.16	100.00
Indirect Distance (CI)	101.11	100.86	100.49
Difference (□)	0.791	0.698	0.490
Fresnel Adjusted	0.774	0.683	0.480
Reduction (NLR)	9.90	9.62	8.85

Resulting Noise Levels

	Auto	Medium Truck	Heavy Truck	24-hour CNEL
Total Attenuated Noise	56.87	55.03	62.83	64.35



Vista Nuevo Lot 4 5 ft Receiver

Target 24-hour CNEL	65
Distance to Receiver	130
Distance to Wall	120
Elevation Change	15
Height of Receiver	5
Hard or Soft Site	Hard
Req'd Height of Wall	6

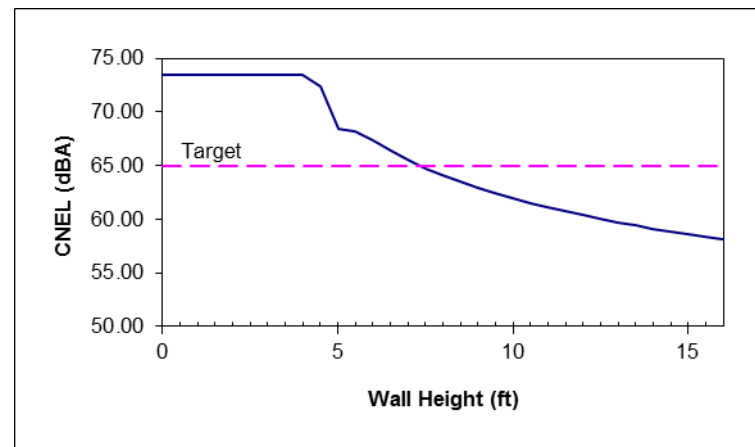
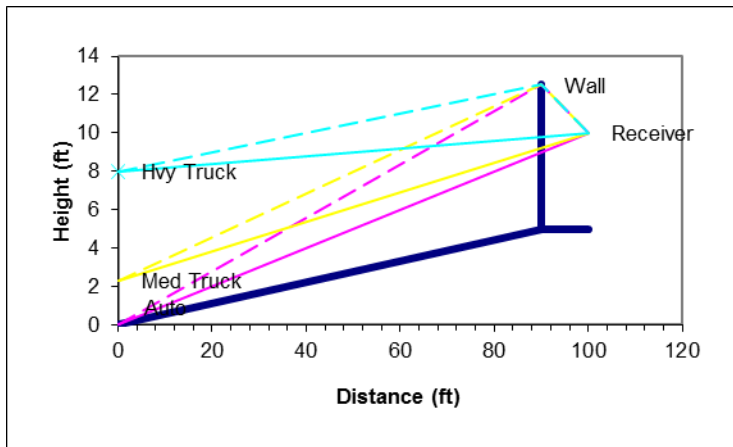
50 ft Reference SPL				
Type	Day	Evening	Night	CNEL
Auto	67.99	66.69	60.64	69.79
Medium Trucks	60.05	52.27	61.48	67.66
Heavy Trucks	67.07	59.28	68.5	74.69
	70.93	67.55	69.84	76.49

	Auto	Med Truck	Hvy Truck
Vehicle Height	0	2.3	8
Net Receiver Height	20	17.7	12
Net Wall Height	21.00	18.70	13.00
Direct LOS Height	18.46	16.34	11.08
Effective Wall Height	21.00	18.70	13.00

Attenuated SPL				
Type	Day	Evening	Night	CNEL
Auto	63.79	62.49	56.44	65.59
Medium Trucks	55.86	48.08	57.29	63.47
Heavy Trucks	62.90	55.11	64.33	70.52
	66.75	63.35	65.67	72.34

	Auto	Med Truck	Hvy Truck
Direct Distance (CD)	131.53	131.20	130.55
Indirect Distance (CI)	131.87	131.50	130.75
Difference (□)	0.344	0.299	0.199
Fresnel Adjusted	0.337	0.292	0.195
Reduction (NLR)	8.12	7.85	7.10

Resulting Noise Levels				
	Auto	Medium Truck	Heavy Truck	24-hour CNEL
Total Attenuated Noise	57.47	55.62	63.42	64.94



Vista Nuevo Lot 4 3 Ft Receiver

Target 24-hour CNEL	65
Distance to Receiver	130
Distance to Wall	120
Elevation Change	15
Height of Receiver	3
Hard or Soft Site	Hard
Req'd Height of Wall	4.5

50 ft Reference SPL

Type	Day	Evening	Night	CNEL
Auto	67.99	66.69	60.64	69.79
Medium Trucks	60.05	52.27	61.48	67.66
Heavy Trucks	67.07	59.28	68.5	74.69
	70.93	67.55	69.84	76.49

	Auto	Med Truck	Hvy Truck
Vehicle Height	0	2.3	8
Net Receiver Height	18	15.7	10
Net Wall Height	19.50	17.20	11.50
Direct LOS Height	16.62	14.49	9.23
Effective Wall Height	19.50	17.20	11.50

Attenuated SPL

Type	Day	Evening	Night	CNEL
Auto	63.80	62.50	56.45	65.60
Medium Trucks	55.87	48.09	57.30	63.48
Heavy Trucks	62.91	55.12	64.34	70.53
	66.76	63.36	65.67	72.34

	Auto	Med Truck	Hvy Truck
Direct Distance (CD)	131.24	130.94	130.38
Indirect Distance (CI)	131.69	131.34	130.66
Difference (□)	0.446	0.394	0.278
Fresnel Adjusted	0.436	0.385	0.272
Reduction (NLR)	8.65	8.39	7.71

Resulting Noise Levels

	Auto	Medium Truck	Heavy Truck	24-hour CNEL
Total Attenuated Noise	56.95	55.09	62.82	64.37

