NOISE IMPACT ANALYSIS

BONANNI RESIDENTIAL PROJECT

FOUNTAIN VALLEY, CALIFORNIA

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BACKGROUND

The project is located at 8572 Talbert Avenue in the City of Fountain Valley. The parcel is 1.41-acres. The project site is currently developed with the remaining house and structures of the historic Courreges Ranch. The proposed project involves redevelopment of the project site with 15 single-family detached residential dwelling units. The proposed project is anticipated to be constructed and fully operational by the year 2024.

The project is expected to generate a total of approximately 142 daily trips, including 11 trips during the AM peak hour and 14 trips during the PM peak hour. Vehicular access is proposed via two driveways on Talbert Avenue. There are adjoining residential uses to the west and to the south of the project property lines.

NOISE SETTING

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally considered to be unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level.

The decibel (dB) scale is used to quantify sound pressure levels. Although decibels are most commonly associated with sound, "dB" is a generic descriptor that is equal to ten times the logarithmic ratio of any physical parameter versus some reference quantity. For sound, the reference level is the faintest sound detectable by a young person with good auditory acuity.

Since the human ear is not equally sensitive to all sound frequencies within the entire auditory spectrum, human response is factored into sound descriptions by weighting sounds within the range of maximum human sensitivity more heavily in a process called “A-weighting,” written as dB(A). Any further reference in this discussion to decibels written as "dB" should be understood to be A-weighted.

Time variations in noise exposure are typically expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called LEQ), or alternately, as a statistical description of the sound pressure level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Ldn (day-night) or the Community Noise Equivalent Level (CNEL). The CNEL metric has gradually replaced the Ldn factor, but the two descriptors are essentially identical.

CNEL-based standards are generally applied to transportation-related sources because local jurisdictions are pre-empted from exercising direct noise control over vehicles on public

streets, aircraft, trains, etc. The City of Fountain Valley therefore regulates the noise exposure of the receiving property through land use controls.

For "stationary" noise sources the City has established noise performance standards designed to not adversely impact adjoining uses. These standards are articulated in the Municipal Code. These standards recognize the varying noise sensitivity of both transmitting and receiving land uses. The property line noise performance standards are normally structured according to land use and time-of-day.

CITY OF FOUNTAIN VALLEY NOISE STANDARDS

The Noise Element of the City of Fountain Valley General Plan establishes noise quality standards for land use categories based on the State of California Office of Noise Control land use compatibility recommendations. Community noise exposures are recommended as normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable for various classes of land use sensitivity. As shown in Table 1, the City of Fountain Valley guidelines an exterior noise exposure standard of 60 dB CNEL is the most desirable level for single-family residential uses while levels of 70 dB CNEL are acceptable for usable outdoor space (patios, decks, pools, etc.). A level of 70 dB CNEL is considered "conditionally acceptable". 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 in the project design. These standards apply to exterior recreational noise.

An interior CNEL of 45 dB 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. In 1988, the State Building Standards Commission expanded that standard to include all habitable rooms in residential use, including single-family dwelling units. For this project an exterior noise level of 70 dB CNEL in any usable outdoor recreational area and interior noise level of 45 dB in any habitable residential indoor space are considered to be the appropriate compatibility standards for residential use.

Ordinance limits generally apply to "stationary" sources such as mechanical equipment, or vehicles operating on private property as shown in Table 1. The applicable requirement is a function of the time of day and appropriate zone. As seen in Table 1, the City's noise ordinance limits are stated in terms of a 30-minute limit with allowable deviations from this 50^{th} percentile standard. The louder the level becomes, the shorter the time becomes that it is allowed to occur. The code allows the "not to exceed" noise limits to be adjusted upwards if the background noise level exceeds the applicable noise standard.

Construction noise is exempt from numerical noise standards from 7 a.m. to 8 p.m. Monday through Friday and 9 a.m. through 8 p.m. on Saturdays with no construction allowed on Sundays and any legal holiday.

Table 1
Fountain Valley Noise Ordinance Standards
Section 6.28.050

Noise Zone 1	Time Period	Exterior Noise Standard
All properties located in residential zone districts	7 a.m.- 10 p.m.	55 dB
	10 p.m.-7 a.m.	50 dB

The not to exceed value for these standards is as follows:

1) The noise standard for a cumulative period of more than thirty (30) minutes in any hour; or
2) The noise standard plus five (5) dB(A) for a cumulative period of more than fifteen (15) minutes in any hour; or
3) The noise standard plus ten (10) dB(A) for a cumulative period of more than five (5) minutes in any hour; or
4) The noise standard plus fifteen (15) dB(A) for a cumulative period of more than one (1) minute in any hour; or
5) The noise standard plus twenty (20) dB(A) for any period of time

The Municipal Code has the following caveat:

In the event the ambient noise level exceeds any of the first four noise limit categories set forth in subsection (b) of this section, the cumulative period applicable to said category shall be increased to reflect said ambient noise level. In the event the ambient noise level exceeds the fifth noise limit category, the maximum allowable noise level under said category shall be increased to reflect the maximum ambient noise level. (Ord. 806 § 2, 1976)

BASELINE NOISE LEVELS

Short term on-site noise measurements were made to document baseline levels in the project area. These help to serve as a basis for projecting future noise exposure from the project upon the surrounding community and noise from the community on the project. Noise measurements were conducted on Monday, December 6, 2022, at approximately 11:30 a.m., at the location indicated below. A map of the location is provided in Figure 2.

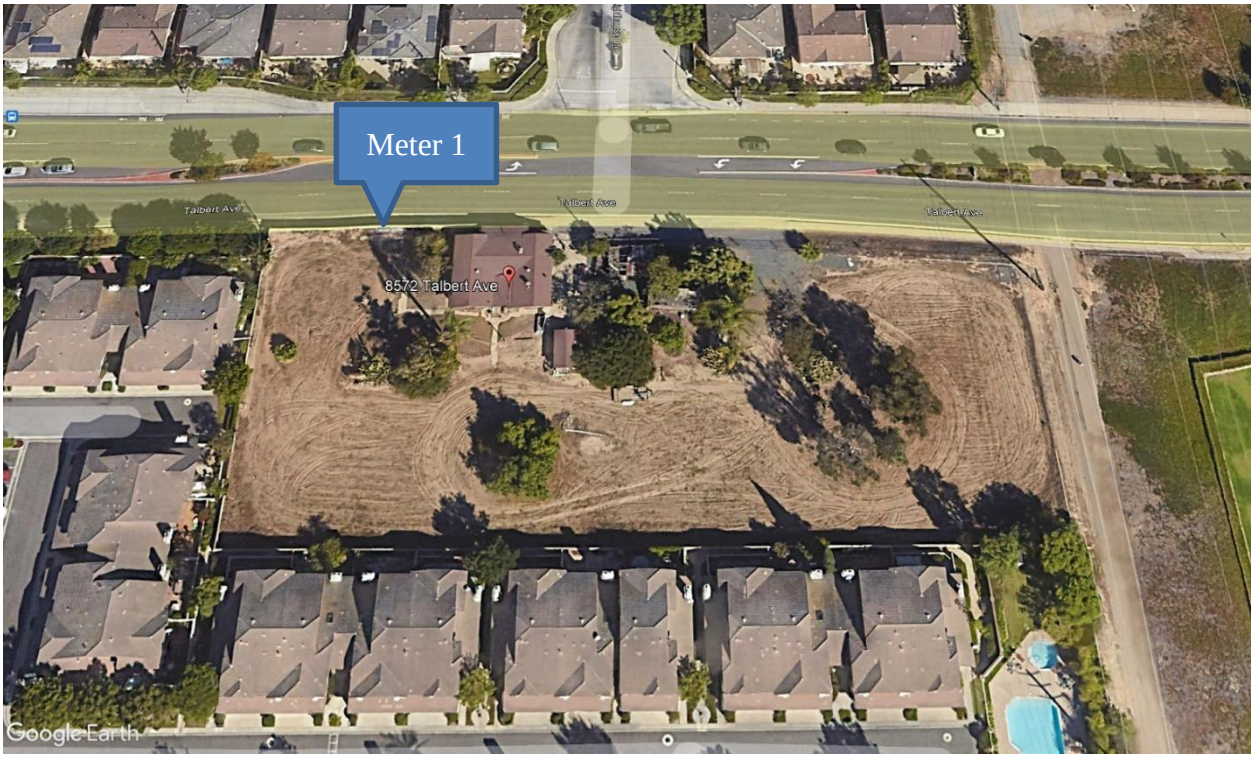
Measured Noise Levels (dBA)

Location	**Leq**	**L_{10}**	**L_{33}**	**L_{50}**	**L_{90}**
On-site, 60-feet to Talbert centerline	57	68	58	56	53

The resultant Leq was lower than expected since Talbert Avenue currently carries approximately 21,000 vehicles per day. However, it was noted that the site is at the top of a hill and some noise was cut off. To be conservative, as shown later in this report, the background noise level was calculated with the daily ADT which would represent a higher noise level than that which could be predicted with the measured Leq.

The City of Fountain Valley considers a noise level of up to 70 dB CNEL "conditionally acceptable" for 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 in the project design.

Figure 1
Noise Meter Location



NOISE IMPACTS

NOISE SIGNIFICANCE CRITERIA

According to the current CEQA Appendix G guidelines, noise impacts are considered potentially significant if they result in:

1. Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of a project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?
2. Generation of excessive groundborne vibration or groundborne noise levels?
3. For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?

The terms "substantial" or "excessive" are not defined in most environmental compliance guidelines. Noise analysis methodology is accurate only to the nearest whole decibel and the human ear can only clearly detect changes of around 3 dBA; changes of less than 3 dBA, while audible under controlled circumstances, are not readily discernable in an outdoor environment. Thus, a change of 3 dBA is considered as a perceptible audible change. It would require a doubling of traffic to create a +3 dBA noise increase due to the logarithmic nature of noise calculations. The project is not within the vicinity of an airport.

SOURCES OF IMPACT

Several characteristic noise sources are typically identified with general development such as the proposed residences. Construction activities, especially heavy equipment, will create short-term noise increases near the project site. Upon completion, vehicular traffic on streets around the proposed project area may create a higher noise exposure. In already-developed areas, the added land use intensity associated with a single project only increases traffic incrementally on existing roadways. These noise impacts are often masked by the baseline, and often preclude perception of any substantial noise level increase. Proposed residential uses represent a passive noise source and it is not anticipated that addition of the proposed homes would measurably alter the existing noise environment.

SENSITIVE RECEPTORS

The 1.41-acre site is located at 8572 Talbert Avenue in the City of Fountain Valley, California. The project site currently contains several structures which will be demolished as part of this project. The project involves redevelopment of the project site with 15 single-family detached residential dwelling units.

The closest residential uses are to the west and south of the site. Homes to the west have between a 16.5 and 20-foot setback from the property line. With project setbacks, the closest residential

building façade has at least a 27-foot setback to the nearest existing off-site structure. There will be a 6-foot masonry wall at the shared property line.

Homes to the south have between a 12–14-foot setback from the property line and at least a 19-foot setback from the closest project façade (side yard setback distance of 5-feet to property line). Again, there will be a 6-foot masonry wall at the property line. Most adjoining homes have their own masonry privacy wall as well.

The structures to be demolished are in the northern center of the site, adjacent to Talbert Avenue with a setback of 95-feet from homes to the west and south. There will be no paved surfaces adjacent to the homes to the west, only homes along the southern boundary.

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 by large, earth-moving equipment sources for demolition and grading. During construction and paving, equipment is generally less noisy.

In 2006, the Federal Highway Administration (FHWA) published the Roadway Construction Noise Model that includes a national database of construction equipment reference noise emissions levels. In addition, the database provides an acoustical usage factor to estimate the fraction of time each piece of construction equipment is operating at full power during a construction phase. The usage factor is a key input variable that is used to calculate the average Leq noise levels.

Table 3 identifies highest (Lmax) noise levels associated with each type of equipment identified for use, then adjusts this noise level for distance to the closest sensitive receptor and the extent of equipment usage (usage factor), which is represented as Leq. The table is organized by construction activity and equipment associated with each activity

Quantitatively, the primary noise prediction equation is expressed as follows for the hourly average noise level (Leq) at distance D between the source and receiver (dBA):

Leq = Lmax @ 50’ – 20 log (D/50’) + 10log (U.F%/100) – I.L.(bar)
Where:
Lmax @ 50’ is the published reference noise level at 50 feet
U.F.% is the usage factor for full power operation per hour
I.L.(bar) is the insertion loss for intervening barriers

For the proposed project, the construction fleet would include equipment such as shown in Table 2 which describes the noise level for each individual piece of equipment at a reference 50-foot distance.

Table 2
Construction Equipment Noise Levels

Phase Name and Duration	Equipment	Usage Factor[1]	Noise @ 50 feet (dB)[2]	Hourly Noise Level @ 50 feet (dB))
Demolition	Concrete Saw	20%	90	83
	Dozer	40%	85	82
	Loader/Backhoe	37%	78	74
Grading	Grader	40%	85	81
	Dozer	40%	85	82
	Loader/Backhoe	37%	78	74
Construction	Crane	16%	81	73
	Loader/Backhoe	37%	78	74
	Welders	46%	74	71
	Generator Set	50%	81	78
	Forklift	20%	75	69
Paving	Paver	50%	77	74
	Mixer	40%	79	75
	Paving Equipment	40%	76	72
	Loader/Backhoe	37%	78	74
	Roller	20%	80	74

Source: FHWA's Roadway Construction Noise Model, 2006

1. Estimates the fraction of time each piece of equipment is operating at full power during a construction operation
2. The Lmax values presented are the actual measured values summarized in the Roadway Noise Model User Guide (FHWA 2006) unless the actual is unavailable in which case the equipment specifications were used.

As discussed, this project could have setbacks closer or farther than the 50-foot reference distance. Since demolition is in the center of the site, noise at the closest western or southern sensitive receptor is attenuated. However, since grading occurs up to the property line, this activity represents the closest noise source. With allowable setbacks, construction activities are at a greater distance than grading. Since only the southern residences will be impacted by paving activities the noise level at the western residences was not calculated. A block wall would assist in blocking construction noise at the adjacent uses. A -5 dBA noise credit was taken for the 6-foot wall.

At the indicated setback distances, the noise levels shown in Table 3 would likely be observed:

Table 3
Construction Noise Equipment Levels at Off-Site Sensitive Uses (dBA Leq)

Phase Name and Duration	Equipment	Noise @ Western Perimeter Homes	Noise @ Southern Perimeter Homes
Demolition	Concrete Saw	72	72
	Dozer	71	71
	Loader/Backhoe	63	63
Grading	Grader	93	88
	Dozer	94	89
	Loader/Backhoe	86	81
Construction	Crane	73	76
	Loader/Backhoe	74	77
	Welders	71	74
	Generator Set	78	81
	Forklift	69	72
Paving	Paver	na	81
	Mixer	na	82
	Paving Equipment	na	79
	Loader/Backhoe	na	81
	Roller	na	81

na-no adjacent paved surfaces

Older homes with single pane windows can reduce noise levels by 25 dB with the windows closed. However, most modern homes are constructed with dual paned windows, which can afford up to a 30-dB noise reduction with closed windows. This would mean that homes to the west would experience an interior noise level of 33-64 dBA and homes to the south would have an interior noise level of 33-59 dBA. This noise reduction could be maintained only on a temporary basis, since it requires that windows always remain closed assuming the structures have air conditioning.

The potential for construction-related noise to adversely affect nearby residential receptors would depend on the location and proximity of construction activities to these receptors. Most construction equipment will be located at a much greater setback than the worst-case examples provided in Table 3.

In addition to adhering to the allowable hours of construction (7 a.m. to 8 p.m. Monday through Friday and 9 a.m. through 8 p.m. on Saturdays with no construction allowed on Sundays and any legal holiday) the following measures are recommended to ensure construction noise impacts are reduced to the lowest level possible:

- Locate stationary construction equipment away from the occupied residential residences; and
- Shut off construction equipment that is not in use; and
- Use electrical power to run air compressors and similar power tools.

These measures are included as conditions on any project construction permits and these limits will serve to minimize any adverse construction noise impact potential. Although construction

equipment noise may be noticeable at times, construction noise impacts are minimized by time restrictions placed on permits which in addition to the recommended measures will minimize any adverse noise impact.

CONSTRUCTION ACTIVITY VIBRATION

Ground-borne vibration occurs 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. Vibration related problems generally occur due to resonances in the structural components of a building because structures amplify groundborne vibration. Within the "soft" sedimentary surfaces of much of Southern California, ground vibration is quickly damped out. Groundborne vibration is almost never annoying to people who are outdoors (FTA 2006).

Groundborne vibrations from construction activities rarely reach levels that can damage structures. 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.

The vibration descriptor commonly used to determine structural damage is the peak particle velocity (ppv) which is defined as the maximum instantaneous positive or negative peak of the vibration signal, usually measured in in/sec. The range of such vibration is shown in Table 4.

Table 4
Human Response To Transient Vibration

Average Human Response	ppv (in/sec)
Severe	2.00
Strongly perceptible	0.90
Distinctly perceptible	0.24
Barely perceptible	0.03

Source: Caltrans Transportation and Construction Vibration Guidance Manual, 2013.

Over the years, numerous vibration criteria and standards have been suggested by researchers, organizations, and governmental agencies. There are no Caltrans or Federal Highway Administration standards for vibration.

According to Caltrans, the threshold for structural vibration damage for modern structures is 0.5 in/sec for intermittent sources, which include impact pile drivers, pogo-stick compactors, crack-and-seat equipment, vibratory pile drivers, and vibratory compaction equipment. The American Association of State Highway and Transportation Officials (AASHTO) (1990) identifies maximum vibration levels for preventing damage to structures from intermittent construction or maintenance activities for residential buildings in good repair with gypsum board walls to be 0.4–0.5 in/sec. The damage threshold criterion of 0.3 in/sec is appropriate for fragile buildings. For the purpose of this analysis because area residences can be older, the 0.3 in/sec damage

threshold for older fragile buildings is used as the evaluation criteria. Below this level there is virtually no risk of building damage. Table 5 shows the predicted vibration levels generated by construction equipment at varying distances.

Table 5
Estimated Vibration Levels During Project Construction

Equipment	PPV at 10 ft (in/sec)	PPV at 15 ft (in/sec)	PPV at 25 ft (in/sec)	PPV at 40 ft (in/sec)	PPV at 50 ft (in/sec)
Large Bulldozer	0.352	0.191	0.089	0.044	0.031
Loaded trucks	0.300	0.163	0.076	0.037	0.027
Jackhammer	0.138	0.075	0.035	0.017	0.012
Small Bulldozer	0.012	0.006	0.003	0.001	<0.001

Source: FHWA Transit Noise and Vibration Impact Assessment

The calculation to determine PPV at a given distance is:

PPVdistance = PPVref*(25/D)^1.5

Where:

PPVdistance = the peak particle velocity in inches/second of the equipment adjusted for distance,

PPVref = the reference vibration level in inches/second at 25 feet, and

D = the distance from the equipment to the receiver.

As seen in Table 6, the predicted vibration levels generated by construction equipment such as a large bulldozer could be above levels that could create structural damage of older residential structures (i.e., 0.3 in/sec) if the dozer were to operate closer than 15-feet to the property line.

Large bulldozers will not likely operate directly at the shared property line. Regardless, any fine grading at the property line should be performed with small bulldozers which are seen above to have much less vibration potential. Therefore, to ensure adequate vibration protection the following mitigation measure is recommended:

- Only small bulldozers shall be permitted to operate within 15 feet of the nearest off-site structures.

VEHICULAR NOISE IMPACTS

The project is expected to generate 142 daily trips. According to the OCTA at the most recent count there were 21,000 vehicles per day on Talbert Avenue in the project vicinity. This would translate to a CNEL level of approximately 68.4 dBA. The addition of the project traffic to existing traffic would only represent a +0.03-noise increase which is below the 3 dBA threshold of

significance. The calculated CNEL is lower than the City of Fountain Valley noise compatibility guidelines.

MECHANICAL EQUIPMENT

Individual unit AC compressors are in the rear corner of the proposed homes. Along the western perimeter the condensers have a 16-20-foot setback to the property line. Along the southern perimeter there is a minimal 5-foot setback to the property line. As discussed, there will be a 6-foot block wall at the property line.

Variable speed air compressors have a sound power noise level of approximately 58 dBA. Adjusting for distance and the 6-foot perimeter noise wall, the adjacent homes would be expected to experience a noise level between 36 and 47 dBA. The exterior noise standard for the City of Fountain Valley is 55 dBA daytime and 50 dBA at night. Noise from the HVAC equipment is not expected to exceed thresholds at the closest sensitive uses with the 6-foot-tall masonry wall at the shared property line. Regardless, all HVAC equipment would be required to demonstrate compliance with the City of Fountain Valley Noise Ordinance Standard.

SUMMARY

Short-term construction noise intrusion and vibration impacts will be limited by conditions on construction permits requiring compliance with the City of Fountain Valley Noise Ordinance. The allowed hours of construction are 7 a.m. to 8 p.m. Monday through Friday and 9 a.m. through 8 p.m. on Saturdays with no construction allowed on Sundays and any legal holiday. In addition, the following construction practices are recommended:

- Locate stationary construction equipment away from the occupied residential structures; and
- Shut off construction equipment that is not in use; and
- Use electrical power to run air compressors and similar power tools.

In the abundance of caution, to ensure adequate vibration protection, a dozer will operate at least 15 feet from the property line. Therefore, the following mitigation measure is recommended:

- Only small bulldozers shall be permitted to operate within 15 feet of the nearest off-site structures

Project traffic noise impacts on area roadways will be less-than-significant.

Stationary source noise such as variable speed HVAC equipment at the project homes should not exceed the City of Fountain Valley nocturnal noise standards at the closest existing homes to the west and south. Nevertheless, all HVAC equipment would be required to demonstrate compliance with the City of Fountain Valley Noise Ordinance Standard.