20. Noise and Vibration

*[**Staff Note:** Updates to the 2010 Construction Noise Threshold Criteria and Control Plan are included as part of the comprehensive update of the Initial Study Assessment Guidelines. The Construction Noise Threshold Criteria and Control Plan has been renamed to the Ventura County Noise and Vibration Assessment Guidelines, which is available for public review.]*

20.1 BACKGROUND AND CONTEXT

20.1.1 Noise

Noise is defined as any unwanted sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise disruptive. Noise impacts can occur during the construction and/or operational phases of a project.

Except for a few large-scale construction projects that last a period of years, most projects involve only short-term construction noise impacts. The severity of construction noise impacts varies based on the location of *noise sensitive uses*; type or phase of construction; combination of equipment used; site layout; and construction methods that are employed.

Operational noise typically includes long-term impacts—that is, impacts that persist throughout the life of a project. Impacts from operational noise vary based on the location of *noise sensitive uses*; type of equipment or machinery routinely used; site layout; and duration and times during which noise-generating uses occur.

20.1.2 Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous (e.g., operating factory machinery) or transient in nature (e.g., explosions). The most common type of environmental impact involving vibration consists of ground vibration, which is the periodic displacement of earth, which creates vibration waves that move through soil and rock strata, foundations of nearby buildings, and then throughout parts of the building structure. Ground-borne vibration can result in sensible movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. The rumbling sound caused by the vibration of room surfaces is called ground-borne noise.

Typical outdoor sources of perceptible ground vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground vibration is rarely perceptible. The operation of construction equipment and construction techniques (e.g., pile driving, blasting, or excavation) can generate temporary ground vibration impacts. Moreover, heavy duty vehicles traveling along roadways with potholes and bumps, steel-wheeled/steel-rail vehicles (e.g., trains), and equipment used in industrial operations which are related to a project can generate recurring ground vibration impacts throughout the life of a project.

Construction activities can generate sufficient ground vibrations to pose a risk to nearby structures and generate ground-borne noise that is discomforting or a nuisance to individuals who live or work close to vibration-generating activities. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants. Vibrations generated by construction activity can be transient, random, or continuous. Transient construction vibrations are generated by blasting and wrecking balls. Continuous vibrations are generated by vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment.

Section 11.6 of the Ventura County General Plan Background Report includes additional technical information on noise and information on existing noise levels throughout Ventura County. Additionally, refer to the Ventura County Noise and Vibration Assessment Guidelines for technical information and guidance on evaluating noise and vibration impacts.

20.2 THRESHOLDS OF SIGNIFICANCE

The determination of significance shall be made on a case-by-case basis and evaluated using the following thresholds of significance as specified below.

NOI-1 A project may have a significant impact if it would generate an increase in *ambient noise levels* in excess of the noise standards established in the Ventura County Noise and Vibration Assessment Guidelines, General Plan, *Area Plan*, and Zoning Ordinance applicable to the project.

NOI-2 A project may have a significant impact if it would generate construction or other vibration in excess of vibration standards established in the Ventura County Noise and Vibration Assessment Guidelines and Section 6.2 (Determine Vibration Impact Criteria) of the Federal Transit Administration's Transit Noise and Vibration Assessment Manual ("FTA Manual").

20.3 IMPACT ANALYSIS

Guidance on addressing the questions from the Initial Study Checklist is provided below. In order to determine whether project impacts exceed or meet the criteria of the thresholds of significance in Section 20.2, the level of impact shall be evaluated based on the appropriate assessment methodologies as outlined below.

(a) Would the project generate an increase in ambient noise levels in excess of the noise standards established in the Ventura County Noise and Vibration Assessment Guidelines, General Plan, and Area Plan and Zoning Ordinance applicable to the project?

Construction-Related Noise Impacts

Construction noise impacts shall be evaluated using the assessment methodology, criteria, mitigation, and reporting procedures provided in the Ventura County Noise and Vibration Assessment Guidelines. All other types of noise impacts shall be evaluated pursuant to the following procedures.

Operational-Related Noise Impacts

Preliminary Assessment

A preliminary assessment shall be conducted by the *Lead Agency*, in coordination with a qualified consultant retained by the applicant, to determine whether an acoustical analysis will be required. The preliminary assessment shall consist of the following:

- Determine the estimated operational noise levels of the noise-generating equipment and activities and the times at which the noise levels would occur.
- Determine the proximity of the noise-generating equipment and activities to the *noise sensitive uses* based on the project plans, information gathered during a site visit, aerial imagery, and land use maps that are available from *County View* and the Ventura County *Resource Management Agency Geographic Information System (RMA GIS) Viewer*.

In general, noise decreases by 5 *dB* for each doubling of the distance from the noise source. If the noise generated from the project is estimated to exceed any of the following standards at the nearest *noise sensitive use*, the noise impact is considered to be potentially significant and an acoustical analysis must be completed:

- Leq1H of 55 *dB(A)*[8] or *ambient noise level* plus three *dB(A)*, whichever is greater, during any hour from 6:00 a.m. to 7:00 p.m.;
- Leq1H of 50 *dB(A)* or *ambient noise level* plus three *dB(A)*, whichever is greater, during any hour from 7:00 p.m. to 10:00 p.m.;
- Leq1H of 45 *dB(A)* or *ambient noise level* plus three *dB(A)*, whichever is greater, during any hour from 10:00 p.m. to 6:00 a.m.;
- The project would result in traffic noise levels above a noise compatibility standard stated in General Plan Policy HAZ-9.2 in an area where traffic noise levels, under existing conditions, do not exceed the County noise compatibility standard; or
- The project would result in an increase in traffic noise levels of three *dBA* or greater in an area where traffic noise levels under existing conditions exceed a County noise compatibility standard stated in General Plan Policy-HAZ 9.2.

Acoustical Analysis

If the preliminary assessment determines that an acoustical analysis is required, the project applicant shall be responsible for conducting the acoustical analysis using a qualified consultant (Appendix 20A). The *Lead Agency* shall ensure that the consultant meets the minimum qualifications. In a continuing effort to update County noise data, a copy of the acoustical analysis shall be sent to the RMA Planning Division.

The purpose of the acoustical analysis is to determine whether the project would result in potentially significant noise impacts; identify any *feasible* mitigation measures that would reduce the severity

[8] A-weighted sound level (dBA or dB(A)) is defined in the General Plan, as may be amended, which states: the sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network specified in the American National Standards Institute Specification for Sound Level Meters, ANSI S 1.4–1983. The A-weighting filter de-emphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.

of the noise impacts; and determine whether the noise impacts, after mitigation, would still be potentially significant. As such, the acoustical analysis must include:

- Discussion of the existing environmental setting (e.g., a description of the noise sources and *ambient noise levels* of the project site and surrounding area);
- Discussion of past, present, and reasonably foreseeable probable future projects that have the potential to contribute to cumulative impacts to the noise environment and, as such, are included in the acoustical analysis;
- Discussion of the methodology used in collecting noise data (e.g., noise equipment and metrics used). Noise measurements should be taken using standard industry practices, after taking into consideration site-specific characteristics (e.g., buildings, walls, topography, and the location of existing and potential future *noise sensitive uses* in relation to noise generators) that may have an influence on the noise measurements;
- Discussion of the methodology used in calculating project-specific and cumulative noise impacts (e.g., noise models used);
- Presentation of the data on the existing noise environment, as well as data on projected noise levels; and
- Initial Study checklist and discussion pursuant to the requirements of the Ventura County Initial Study Assessment Guidelines.

Preparation of Initial Study Checklist

A determination of **Less Than Significant Impact (LS)** shall be made if the project would not generate construction or operational noise in excess of the noise standards established in the Ventura County Noise and Vibration Assessment Guidelines, General Plan, and *Area Plan* and Zoning Ordinance applicable to the project.

A determination of **Less Than Significant Impact with Mitigation Incorporated (LS-M)** shall be made if the acoustical analysis shows that the project would result in significant noise impacts, but *feasible* mitigation measures could be incorporated into the project to reduce the impact to a less than significant level.

A determination of **Potentially Significant (PS)** shall be made and further analysis shall be addressed in an environmental impact report (EIR) if there is *substantial evidence* that the project would result in significant noise impacts.

(b) Would the project generate construction or other vibration in excess of vibration standards established in the Ventura County Noise and Vibration Assessment Guidelines and Section 6.2 (Determine Vibration Impact Criteria) of the FTA Manual?

The *Lead Agency* shall consider past, present, and reasonably foreseeable probable future projects within the vicinity of the project site that have the potential to contribute to cumulative impacts relating to vibration.

Construction Vibration Impact Analysis

The *Lead Agency* shall request from the project applicant information regarding the types of construction activities that would be required; duration of each construction phase; and types and number of construction equipment that would be used during each phase of construction.

Construction vibration impacts shall be evaluated using the assessment methodology and construction vibration thresholds of significance identified in the Ventura County Noise and Vibration Assessment Guidelines. Additional guidance for conducting the assessment and reporting findings can be found in the FTA Manual. Projects that would generate new heavy vehicle (e.g., semi-truck or bus) trips on uneven roadways located in proximity to a *vibration sensitive use category* shall be evaluated using the methodology prescribed for rubber-tire heavy vehicle *transit uses* in the Ventura County Noise and Vibration Assessment Guidelines. Additional guidance for conducting the assessment and reporting findings can be found in the FTA Manual. The assessment must include responses to the Initial Study Checklist.

Other Vibration-Related Impacts

The *Lead Agency* shall determine whether the project is located within the vicinity of a *vibration sensitive use category*. If the project is located within the vicinity of a *vibration sensitive use category* and would result in a significant vibration impact, the project applicant shall be responsible for conducting a General Vibration Assessment or Detailed Vibration Analysis consistent with the assessment procedures outlined in Section 6.2 of the FTA Manual, as appropriate, using a qualified consultant (see Appendix 20A). Ground-borne vibration impacts shall be evaluated according to the assessment methodology and threshold criteria contained in the Ventura County Noise and Vibration Assessment Guidelines.

Preparation of Initial Study Checklist

A determination of **Less Than Significant Impact (LS)** shall be made if the vibration impact analysis, General Vibration Assessment, or Detailed Vibration Analysis shows that the project would not result in a significant vibration impact.

A determination of **Less Than Significant Impact with Mitigation Incorporated (LS-M)** shall be made if the analysis shows that the project would result in significant vibration impacts, but *feasible* mitigation measures will be incorporated into the project to reduce the impact to a less than significant level.

A determination of **Potentially Significant (PS)** shall be made and further analysis shall be addressed in an EIR if there is *substantial evidence* that the project would result in significant vibration impacts.

20.4 RESOURCES & REFERENCES

Source	Managing Agency/Organization	Online Access
Resources		
Ventura County CEQA Implementation Manual	Ventura County Resource Management Agency (RMA) Planning Division	PDF | Website
Ventura County Initial Study Assessment Guidelines, Introduction	Ventura County RMA Planning Division	PDF | Website
Ventura County Initial Study Checklist Template	Ventura County RMA Planning Division	PDF | Website
References		

Source	Managing Agency/Organization	Online Access
County View	Ventura County Geographic Information Systems	Website
Transportation and Construction Vibration Guidance Manual	California Department of Transportation (Caltrans)	PDF | Website
Transit Noise and Vibration Impact Assessment Manual	Federal Transit Administration (FTA)	PDF | Website
Highway Construction Noise Handbook	Federal Highway Administration (FHWA)	Website
Ventura County General Plan Background Report, Chapter 11	Ventura County RMA Planning Division	PDF | Website
Ventura County General Plan, Hazards and Safety Element	Ventura County RMA Planning Division	PDF | Website
Ventura County Noise and Vibration Assessment Guidelines	Ventura County RMA Planning Division	PDF | Website
Ventura County RMA Geographic Information Systems Viewer	Ventura County Information Technology Services	Website

APPENDIX 20A

Noise Consultant Qualifications

Noise consultants must demonstrate that they meet the minimum qualifications as defined below:

Education

Consultants should hold an advanced degree from an accredited institution (e.g., M.A., M.S., or Ph.D.) in Physics, Mathematics, Engineering or related discipline. Consultants without an advanced degree in these fields must provide documentation of at least five years of relevant research or field work in acoustical engineering.

Experience

All consultants must possess a working knowledge of physics, acoustical principles, utilization of sound level meters, and applicable state codes. Experience with CEQA is highly desirable. Consultants also must have experience in the following:

- Acquiring and evaluating data;
- Creating mitigation monitoring and reporting programs; and,
- Evaluating designs for compliance with standards relative to land use.

Local and State Expertise

Consultants must provide evidence of expertise in community/industrial noise (e.g., the preparation of Noise Elements of General Plans, technical reports, studies, mitigation measures, or noise ordinances).

Professional Certification

Evidence of professional certification is highly desirable though not required.

Vibration Consultant Qualifications

Vibration consultants must demonstrate that they meet the minimum qualifications as defined below:

Education

Consultants should hold an advanced degree from an accredited institution (e.g., M.A., M.S., or Ph.D.) in Physics, Mathematics, Engineering or related discipline. Consultants without an advanced degree in these fields must provide documentation of at least five years of relevant research or field work in engineering activities involving vibration impact assessment.

Experience

All consultants must possess a working knowledge of physics, vibration principles, and applicable state codes. Experience with CEQA is highly desirable. Consultants also must have at least five years experience in the following:

- Acquiring and evaluating data;

- Creating mitigation monitoring and reporting programs; and,
- Evaluating designs for compliance with standards relative to land use.

Local and State Expertise

Consultants must provide evidence of expertise in transportation, construction, and/or industrial vibration (e.g., the preparation of environmental assessments, technical reports, studies, or mitigation measures).

Professional Certification

Evidence of professional certification is highly desirable though not required.