Chapter 11
Noise

11.1 Introduction

This chapter provides a description and evaluation of the potential noise-related impacts associated with project construction and operation.

The following is a brief discussion of noise terminology used in this assessment.

- *Sound.* A vibratory disturbance created by a vibrating object, which, when transmitted by pressure waves through a medium such as air, is capable of being detected by a receiving mechanism, such as the human ear or a microphone.
- *Noise.* Sound that is loud, unpleasant, unexpected, or otherwise undesirable.
- *Decibel (dB).* A unitless measure of sound on a logarithmic scale, which indicates the squared ratio of sound pressure amplitude to a reference sound pressure amplitude. The reference pressure is 20 micro-pascals.
- *A-Weighted Decibel (dBA).* An overall frequency-weighted sound level in decibels which approximates the frequency response of the human ear.
- *Equivalent Sound Level (L_{eq}).* The equivalent steady state sound or vibration level which in a stated period of time would contain the same acoustical or vibration energy.
- *Day-Night Level (L_{dn}).* The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring during the period from 10:00 p.m. to 7:00 a.m.

In general, human sound perception is such that a change in sound level of 3 dB is just noticeable, a change of 5 dB is clearly noticeable, and a change of 10 dB is perceived as a doubling or halving of sound level.

11.2 Affected Environment

11.2.1 Regional Setting

The areas surrounding the proposed project construction area are generally rural, with a nearby residential area to the east. The predominant noise source in this area is traffic on I-80, Union Pacific Railroad trains, and nearby local streets. Background sound levels in this type of area are typically in the range of 40–60 dBA, depending the proximity of the receptor to major traffic noise sources. Planning guidelines and regulations relating to noise are discussed below.

11.2.2 Regulatory Setting

Most cities and counties have noise ordinances, which serve as enforcement mechanisms for controlling noise, and general plan noise elements, which are used as planning guides to ensure that noise generated by a source is compatible with adjacent land uses.

The Nevada County general plan noise element has exterior noise limits for each land use category. However, Policy 9.1.f of the Nevada County noise element states that the standards do not apply to activities associated with the actual construction of a project.

11.3 Impact Assessment Methodology

11.3.1 Analytical Approach

After the proposed project is completed, occasional maintenance activities would be the only source of project-related noise. Accordingly, construction activity was the only project-related activity assessed for noise impacts. The evaluation of construction noise effects contained in this chapter was based on the assessment guidelines recommended by the Federal Transit Administration (FTA) (Federal Transit Administration 1995). To assess construction noise effects, typical construction noise levels are predicted and compared to the background noise level in the vicinity of the project construction area.

11.3.2 Criteria for Determining Impact Significance

Criteria based on the State CEQA Guidelines and professional judgement were used to determine the significance of noise-related impacts. These criteria state that the proposed project would have a significant impact on noise if it would:

- expose people to, or generate, noise levels in violation of standards established in the local general plan or noise ordinance or in applicable standards of other agencies;
- expose persons to excessive groundborne vibration or groundborne noise levels;
- cause a substantial permanent increase in ambient noise levels in the vicinity above existing, no-project levels; or
- cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above existing, no-project levels.

Noise impacts were evaluated based on a substantial noise increase (e.g., 10 dBA) as compared to the background noise level.

11.4 Impacts and Mitigation Measures of Alternative A: Proposed Project

11.4.1 Construction-Related Impacts

Impact 11-1: Temporary Increase in Noise Levels Resulting from General Construction Activities

Construction of the proposed project would result in temporary increases in noise in the vicinity of the project construction area. Primary noise-generating activities would include excavation, grading, and scraping. Vehicle traffic traveling to and from the construction area may affect noise in the area, but to a lesser degree. The magnitude of construction noise impacts would depend on the type of construction activity, the noise level generated by various pieces of construction equipment, the duration of the activity, the distance between the activity and noise-sensitive receivers, and whether local barriers and topography provide shielding effects. Table 11-1 shows L_{eq} values for various types of construction equipment that may be used during construction.

Table 11-1. Noise Emission Levels Typical for Construction Equipment

Equipment	Typical Noise Level (dBA) 50 Feet From Source
Backhoe	80
Grader	85
Loader	85
Roller	75
Bulldozer	85
Truck	88
Scraper	89

Note: dBA = A-weighted decibel scale.

Source: Federal Transit Administration 1995.

A reasonable worst-case assumption is that the 3 loudest pieces of equipment would operate simultaneously and continuously over at least 1 hour. The combined sound level of 3 of the loudest pieces of equipment listed in table 11-1 (scraper, truck, and bulldozer) is 92 dBA measured at 50 feet. Table 11-2, which assumes this combined source level, summarizes predicted noise levels at various distances from an active construction site. These estimations of noise levels take into account distance attenuation, attenuation from molecular absorption, and anomalous excess attenuation (Hoover 1996).

Table 11-2. Estimated Construction Noise in the Project Construction Area

Distance Attenuation	
Distance to Receptor (Feet)	Sound Level at Receptor (dBA)
50	92
100	86
200	80
400	73
600	69
800	67
1,000	64
1,500	60
2,000	57
2,500	54
3,000	51
4,000	47
5,280	43
7,500	36

The following assumptions were used:

Basic sound level drop-off rate: 6.0 dB per doubling of distance
Molecular absorption coefficient: 0.7 dB per 1,000 feet
Analogous excess attenuation: 1.0 dB per 1,000 feet
Reference sound level: 92 dBA
Distance for reference sound level: 50 feet

This calculation assumes simultaneous operation of 1 scraper, 1 truck, and 1 bulldozer.

The results in table 11-2 indicate the potential for residences within approximately 1,500 feet of active construction sites to be exposed to substantial increases in noise, assuming a background sound level of 50 dBA. This impact is considered ***significant.*** Implementation of Mitigation Measures 11-1–11-3 would reduce this impact to a less-than-significant level.

Mitigation Measure 11-1: Notify property owners of project construction before construction begins

In order to prevent noise impacts on nearby residences, the project applicant will give notice of construction timing to the owners of all residential and other noise-sensitive properties within 1,500 feet of the project construction area prior to when construction activities will take place. A notification packet will be sent to property owners; the packet will identify the intended construction schedule,

the duration of noise-generating construction activities, and a telephone number of the Nevada County building department, to use for communicating noise complaints. Nevada County staff will contact the project applicant regarding construction noise if necessary.

Mitigation Measure 11-2: Use appropriate sound-control devices on construction equipment

During construction, the contractor will ensure that all equipment have sound-control devices no less effective than those provided by the manufacturer. All equipment will be operated and maintained to minimize noise generation. No equipment will have unmuffled exhausts.

Mitigation Measure 11-3: Implement measures required by Nevada County grading permit

Throughout the construction period, the contractor will implement appropriate additional noise mitigation measures, including, but not limited to, changing the location of stationary construction equipment, shutting off idling equipment, rescheduling construction activity, and installing acoustic barriers around stationary construction noise sources. Appropriate measures will be implemented at the request of Nevada County.

Impact 11-2: Temporary Increase in Noise Levels Resulting from Blasting Activities

Blasting of rocks would result in a temporary increase in noise levels during daytime hours. A typical sound level for blasting, measured at 50 feet from the source, is 94 dBA (Hoover 1996). Table 11-3 shows estimated blasting noise levels in the vicinity of an active blasting site and lists the assumptions on which the noise-level calculations were based. As indicated in table 11-3, sensitive receptors within about 1,500 feet of the blasting site could be exposed to substantial increases in noise, assuming a background sound level of 50 dBA. Because residences and properties exist within approximately 1,500 feet of the construction area, this impact is considered ***significant***.

Implementation of Mitigation Measures 11-1 and 11-4 would reduce this impact to a less-than-significant level.

Table 11-3. Estimated Blasting Noise in the Project Construction Area

Distance Attenuation	
Distance to Receptor (Feet)	Sound Level at Receptor (dBA)
50	94
100	88
200	82
400	75
600	71
800	69
1,000	66
1,500	62
2,000	59
2,500	56
3,000	53
4,000	49
5,280	45
7,500	38

The following assumptions were used:

Basic sound level drop-off rate: 6.0 dB per doubling of distance
Molecular absorption coefficient: 0.7 dB per 1,000 feet
Analogous excess attenuation: 1.0 dB per 1,000 feet
Reference sound level: 94 dBA
Distance for reference sound level: 50 feet

Mitigation Measure 11-1: Notify property owners of project construction before construction begins

This mitigation measure is described above, under Impact 11-1.

Mitigation Measure 11-4: Minimize effects of blasting on nearby residents

In order to minimize effects of blasting on nearby residents, the project contractor will restrict blasting to between 8:00 a.m. and 5:00 p.m. This restriction will ensure that blasting occurs when residents are more likely to be away from their homes or able to leave the area if necessary to avoid the noise effects of blasting. In addition, the contractor will use the best available technology, such as blast mats or other techniques, to minimize noise generated by blasting.

11.4.2 Operation-Related Impacts

There are no noise-related operational impacts identified for the proposed project. No mitigation is required.