

2.11 Noise

<i>Issues (and Supporting Information Sources):</i>	<i>Potentially Significant Impact</i>	<i>Less Than Significant with Mitigation Incorporation</i>	<i>Less Than Significant Impact</i>	<i>No Impact</i>
11. NOISE—Would the project:				
a) Result in 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?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Setting

Noise Background

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise can be defined as unwanted sound. Sound is characterized by various parameters that include the rate of oscillation of sound waves (frequency), the speed of propagation, and the pressure level or energy content (amplitude). In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain.

Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). When all the audible frequencies of a sound are measured, a sound spectrum is plotted consisting of a range of frequency spanning 20 to 20,000 Hz. The sound pressure level, therefore, constitutes the additive force exerted by a sound corresponding to the sound frequency/sound power level spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner

corresponding to the human ear's decreased sensitivity to low and extremely high frequencies instead of the frequency mid-range. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA).¹

Noise Exposure and Community Noise

An individual's noise exposure is a measure of the noise experienced by the individual over a period of time. A noise level is a measure of noise at a given instant in time. However, noise levels rarely persist consistently over a long period of time. In fact, community noise varies continuously with time with respect to the contributing sound sources of the community noise environment. Community noise is primarily the product of many distant noise sources, which constitute a relatively stable background noise exposure, with the individual contributors unidentifiable. Background noise levels change throughout a typical day, but do so gradually, corresponding with the addition and subtraction of distant noise sources and atmospheric conditions. The addition of short duration single event noise sources (e.g., aircraft flyovers, motor vehicles, sirens) makes community noise constantly variable throughout a day.

These successive additions of sound to the community noise environment vary the community noise level from instant to instant requiring the measurement of noise exposure over a period of time to legitimately characterize a community noise environment and evaluate cumulative noise impacts. This time-varying characteristic of environmental noise is described using statistical noise descriptors. For the purposes of this noise analysis, the most important noise descriptor is the equivalent sound level (L_{eq}). The L_{eq} is used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The L_{eq} is the constant sound level which would contain the same acoustic energy as the varying sound level, during the same time period (i.e., the average noise exposure level for the given time period).

Effects of Noise on People

The effects of noise on people can be placed into three categories:

- Subjective effects of annoyance, nuisance, dissatisfaction;
- Interference with activities such as speech, sleep, learning; and
- Physiological effects such as hearing loss or sudden startling.

Environmental noise typically produces effects in the first two categories. Workers at industrial plants often experience noise in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or the corresponding reactions of annoyance and dissatisfaction. A wide variation exists in the individual thresholds of annoyance, and different tolerances to noise tend to develop based on an individual's past experiences with noise.

Thus, an important way of predicting a human reaction to a new noise environment is the way the new noise compares to the existing noise levels to which one has adapted: the so called "ambient noise" level. In general, the more a new noise exceeds the previously existing ambient noise

¹ All noise levels reported herein reflect A-weighted decibels unless otherwise stated.

level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived;
- Outside of the laboratory, a 3 dBA change is considered a just-perceivable difference when the change in noise is perceived but does not cause a human response;
- A change in noise level of at least 5 dBA is required before any noticeable change in human response would be expected; and
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause an adverse response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. A ruler is a *linear* scale: it has marks on it corresponding to equal quantities of distance. One way of expressing this is to say that the ratio of successive intervals is equal to one. A *logarithmic* scale is different in that the ratio of successive intervals is not equal to one. Each interval on a logarithmic scale is some common factor larger than the previous interval. A typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc., doubling the variable plotted on the x-axis. The human ear perceives sound in a non-linear fashion; hence the decibel scale was developed. Because the decibel scale is based on logarithms, two noise sources do not combine in a simple additive fashion, rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA, not 100 dBA.

Noise Attenuation

Point sources of noise, including stationary mobile sources such as idling vehicles or onsite construction equipment, attenuate (lessen) at a rate of 6 dBA to 7.5 dBA per doubling of distance from the source, depending upon environmental conditions (e.g., atmospheric conditions, noise barriers, type of ground surface, etc.). Widely distributed noises such as a large industrial facility spread over many acres or a street with moving vehicles (a “line” source) would typically attenuate at a lower rate of approximately 3 to 4.5 dBA per doubling distance from the source (also dependent upon environmental conditions) (Caltrans, 1998).

Sensitive Receptors

Human response to noise varies considerably from one individual to another. Effects of noise at various levels can include interference with sleep, concentration, and communication, and can cause physiological and psychological stress and hearing loss. Given these effects, some land uses are considered more sensitive to ambient noise levels than others. In general, residences, schools, hotels, hospitals, and nursing homes are considered to be the most sensitive to noise. Places such as churches, libraries, and cemeteries, where people tend to pray, study, and/or contemplate are also sensitive to noise. Commercial and industrial uses are considered the least noise-sensitive. The closest sensitive receptors to the proposed Morrison Creek Substation site are residences along E. Denny Street, approximately 500 feet to the south, along the west side of U.S.

Highway 101 (U.S. 101). The closest sensitive receptors to the existing Simonson Substation are approximately 700 feet to the west, across U.S. 101 and just west of Rowdy Creek.

Existing Ambient Noise Environment

The primary contributor to the noise environment in the Proposed Project study area is vehicle traffic along U.S. 101. Ambient L_{eq} noise levels were measured adjacent to the residences along E. Denny Street to characterize the noise environment in the vicinity of the closest noise sensitive receptors to the proposed Morrison Substation site. The measurement location was approximately 200 feet west of the U.S. 101 right-of-way and the measurement was recorded at approximately 2:00 p.m. The 10-minute L_{eq} was measured to be approximately 59 dBA. Based on this noise level, it is estimated that the L_{eq} at the nearest residence west of the Simonson Substation was approximately 55 dBA.

Regulatory Context

Federal, State, and local agencies regulate different aspects of environmental noise. Federal and State agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies. Local regulation of noise involves implementation of general plan policies and noise ordinance standards. Local general plans identify general principles intended to guide and influence development plans; local noise ordinances establish standards and procedures for addressing specific noise sources and activities.

Del Norte County

The Del Norte County Code and General Plan do not contain any noise restrictions or standards that would be applicable to the construction of the Proposed Project. The Del Norte County General Plan includes the following noise policy that is applicable to the operations of the Proposed Project (Del Norte County, 2003):

Policy 2.H.3: Stationary Noise. Proposed projects which include potentially significant noise generation [i.e., with the potential to exceed the standards shown in Table 2.11-1] or development of new land uses adjacent to an existing or proposed stationary source of noise shall be required to submit a noise study that includes specific recommendations for mitigation. This policy does not apply to noise levels associated with agricultural and gravel extraction (but not processing) operations.

Noise Impacts and Mitigation Measures

Equipment noise during Proposed Project construction is the primary concern in evaluating short-term noise impacts. During operation, noise from the Morrison Creek Substation equipment would be the primary concern associated with long-term noise impacts.

Temporary impacts during construction are considered significant if they would substantially interfere with affected land uses. Substantial interference could result from a combination of

**TABLE 2.11-1
MAXIMUM NOISE EXPOSURE FOR NOISE SENSITIVE AND OTHER USES DUE TO STATIONARY
NOISE SOURCES (HOURLY L_{eq} IN dB)**

Duration	Day (7 a.m. to 10 p.m.)	Night (10 p.m. to 7 a.m.)
Sensitive Land Uses		
Residential	62	57
Other Sensitive Land Uses	52	47
Other Land Uses		
Commercial Uses	62	57
Industrial and Heavy Commercial uses	67	62

NOTES: L_{eq} levels are to be determined at the property line of the receiver. When determining effectiveness of noise mitigation measures, the standards may be applied on the receptor side of noise barriers or other property-line noise mitigation measures. Sound measurements shall be made with the noise meter set to the slow response setting.

SOURCE: Del Norte County, 2003.

factors including: the generation of noise levels substantially greater than existing ambient noise levels, construction efforts lasting long periods of time, or construction activities that would affect noise-sensitive uses during the nighttime. The Proposed Project's operational impact on the ambient noise environment would be considered substantial if it would result in ambient daytime L_{eq} noise levels above 62 dBA or nighttime L_{eq} noise levels above 57 dBA at residential land uses.

Evaluation of potential noise impacts that would result from Proposed Project construction and operations included reviewing relevant County noise standards and policies, characterizing the existing noise environment throughout the Proposed Project study area, and projecting noise from construction and operation of Proposed Project. Impacts were assessed by comparing substation equipment specifications and published noise levels of construction equipment to the ambient noise environment and significance criteria.

- 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: *Less than significant with mitigation.* See discussion under d).**
- d) **A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project: *Less than significant with mitigation.***

Potential noise impacts associated with construction and operation of the Proposed Project include noise from construction equipment and operation of the transformer and monthly maintenance activities at the proposed Morrison Creek Substation.

Construction

Construction of the Proposed Project would consist of installation of the new Morrison Creek Substation, then the removal of the existing Simonson Substation. The proposed Morrison Creek and existing Simonson substation sites are 500 feet and 700 feet, respectively, from the nearest sensitive receptors. Proposed Project total construction activities are expected to last for approximately three months, with loud construction activity estimated to last for approximately one month at each site.

Construction noise sources are typically regulated on the local level through enforcement of noise ordinances, implementation of general plan policies, and imposition of conditions of approval for permits. However, Del Norte County does not have General Plan standards or Municipal Codes that address construction noise.

Construction of the Proposed Project would require a variety of equipment types. During the construction period, noise levels would be generated that would vary depending on the particular type, number, and duration of use of various pieces of construction equipment. Typical noise levels at 50 feet from the source for some of the heavy pieces of construction equipment that would be required to construct the Proposed Project are listed in Table 2.11-2.

**TABLE 2.11-2
TYPICAL NOISE LEVELS FROM CONSTRUCTION EQUIPMENT**

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)
Mobile Crane	83
Truck	88
Backhoe	80
Bulldozer	85
Roller	74

SOURCE: FTA, 2006.

As shown in Table 2.11-2, intermittent and continuous use of construction equipment would generate noise levels between 74 and 88 dBA at 50 feet. It is estimated that noise levels at the construction sites would average up to 85 dBA while heavy construction equipment is operating. This equates to a noise level of approximately 65 dBA at 500 feet and 62 dBA at 700 feet, which would be approximately six to seven dBA higher than the ambient conditions at the nearest sensitive receptor locations. However, given the relatively short duration of impacts, construction noise would not be considered significant at affected residences if construction would be limited to daytime hours. Implementation of the Mitigation Measure 2.11-1 would ensure that the impact of construction noise would be less than significant.

Impact 2.11-1: The Proposed Project could generate adverse noise levels during project construction. This would be a less than significant impact with implementation of Mitigation Measure 2.11-1.

Mitigation Measure 2.11-1: Construction activity shall be limited to the least noise-sensitive daytime hours between 7:00 a.m. and 8:00 p.m., with some exceptions (as approved by the CPUC) as required for safety considerations or certain construction procedures that cannot be interrupted.

Significance after Mitigation: Less than significant.

Operation

Operation of the Morrison Creek Substation would not result in any appreciable increase to the existing average ambient noise levels at the residences closest to the proposed substation site. The loudest piece of equipment that would operate at the substation would be the transformer. Based on the specifications of the proposed transformer (PacifiCorp, 2007), it would generate a noise level of approximately 53 dBA at 50 feet and 33 dBA at 500 feet. Transformer noise at the residences along E. Denny Street would be well below the County's specified maximum noise exposure levels due to stationary sources, and would likely be inaudible because the noise levels would be less than ambient levels. In addition, operational activities would include the monthly use of a light-duty truck or automobile to inspect the facilities of the substation. This would result in a negligible impact to long-term ambient conditions in the study area. Therefore, operational impacts associated with the Proposed Project would be less than significant.

b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels: *Less than significant.*

The use of blasting and/or pile drivers are not included as part of the Proposed Project. The Proposed Project would involve temporary sources of groundborne vibration and groundborne noise during construction from operation of heavy equipment. During construction, operation of heavy equipment would generate localized groundborne vibration and groundborne noise that could be perceptible in the immediate vicinity of the construction site. However, since no residences or other structures occupied by people would be in the immediate vicinity of construction activities, the impact from construction-related groundborne vibration and groundborne noise would be less than significant.

c) Permanent increase in ambient noise levels in the project vicinity above levels existing without the project: *Less than significant.*

As discussed above in d), the only permanent noise sources that would be introduced by the Proposed Project would be transformer and inspection automobile noise associated

with the new substation. However, these increases would not be considered significant; as they would result in noise levels well below the County's identified maximum noise exposure levels. Therefore, the long-term impact of the Proposed Project on ambient noise levels in the study area would be less than significant.

- e) **Expose people residing or working in the area to excessive noise levels if the project is located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels: *No impact.***

The Proposed Project would not involve the development of noise-sensitive land uses, and therefore, would not expose people to excessive noise levels.

- f) **Expose people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip, would the project expose people residing or working in the area to excessive noise levels: *No impact.***

The Proposed Project is not in the vicinity of a private airstrip; therefore, would not expose people to excessive noise levels.

References – Noise

California Department of Transportation (Caltrans). 1998. *Technical Noise Supplement*, 1998.

Del Norte County. 2003. *Del Norte County General Plan, Section 2: Safety and Noise*. January 28, 2003

Federal Transit Administration (FTA). 2006. *Transit Noise and Vibration Impact Assessment*, May 2006.

PacifiCorp. 2007. Responses to Energy Division Data Requests 1-27. August 28, 2007.