CONSTRUCTION NOISE ANALYSIS

SINGING TREES, RICHARDSON GROVE OPERATIONIAL IMPROVEMENT PROJECT

HUMBOLDT 101

01-HUM-101
PM 1.1/2.2
EA: 01-464800

Prepared for
Caltrans
District 1 Eureka

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Executive summary

The California Department of Transportation (Caltrans) has initiated a project to improve a segment of U.S. Highway 101 (US 101) thru Richardson Grove State Park in Humboldt County.

Truck restrictions at Richardson Grove are due to tightness of the curves, making it difficult for longer trucks to stay within the traveled way. The 1.3 mile stretch of Richardson Grove is the only remaining location on Route 101 restricting access of STAA (Surface Transportation Assistance Act) trucks traveling into Humboldt County from the south

The project proposes minor realignments and widening of US Route 101 to correct STAA restrictions. The proposed project is broken up into three sections: Segment 1 from PM 1.11 to PM 1.70, Segment 2 from PM 1.70 to PM 2.04, and Segment 3 from PM 2.04 to PM 2.20. The curves restricting STAA access are located in segments 1 and 3. Cuts and fills to accommodate realignments and widening, drainage improvements, repaving, and restriping would occur in segments 1 and 3. Only pavement overlay and restriping with one minor drainage improvement would occur in segment 2.

Due to the scope of work, this project is considered a Type III project and it is exempt from traffic noise impact analysis under Title 23, Part 772 of the Code of Federal Regulations (23CFR772). Traffic noise impact is not anticipated to occur, therefore, abatement is not considered for long-term operation.

FHWA requires traffic noise impact analysis for Type I projects which is defined as a proposed Federal or Federal-aid highway project for the construction of a highway on a new location, or the physical alteration of an existing highway where there is either a substantial horizontal or substantial vertical alteration, or an addition of a through-traffic lane(s).

Substantial Vertical Alignment alteration includes when a project removes shielding thereby exposing the line-of-sight between the receptor and the traffic noise source. This is done by altering either the vertical alignment of the highway or the topography between the highway traffic noise source and the receptor. There are no natural or man-made shielding in the project limit that breaks the line of sight between source of noise (highway) and a receptor. Therefore, the alteration of vertical alignment with regard to traffic noise is not considered substantial for this project. Substantial Horizontal Alignment alteration is defined by a project that halves the distance between the traffic noise source and the closest receptor between the existing condition to the future build condition.

A construction noise impact analysis has been prepared to 1) evaluate noise level changes due to construction traffic staging 2) evaluate noise levels due to construction activity and

associated equipment 3) identify potential construction noise abatement measures which may be included as BMPs (Best Management Practices) if deemed feasible and practical by the PDT.

Existing normal "worst-hour" traffic noise levels along this segment of US101 were projected using the FHWA TNM (Traffic Noise Model) and field sound level measurements. Existing traffic noise levels range from 63-69 dBA Leq. During construction traffic staging noise levels are projected to range from 62-68 dBA, lowering noise levels by 1 dBA due to shifting of traffic away from subject property as well as reduced speeds.

Construction of the project is anticipated for day as well as evening hours and would temporarily increase noise levels in the vicinity of construction activities. Construction-related noise levels are normally highest during the demolition and earthwork phases of construction because of the use of heavy equipment and the tools/methods used during these phases. Construction noise levels were projected using the FHWA RCN (Roadway Construction Noise Model). Construction noise levels are projected to range from 59-92 dBA Leq.

Potential temporary noise abatement measures have been identified and are included in this report under section "***Construction Noise Control Measures***". Measures to be deemed "feasible and practical" included as a BMP will be the determination of the PDT.

Table 1 summarizes all noise levels.

Table 1

Noise Level Summary - Singing Trees Recovery Center (footnote 1)

	Existing "Worst-Hour" Noise Levels dBA Leq(1hr)	Construction Traffic Staging "Worst-Hour" Noise Levels dBA Leq(1hr)	Construction Noise Levels dBA Leq(1hr)
R1	67	66	68-87
R2	69	68	73-92
R3	63	62	59-78

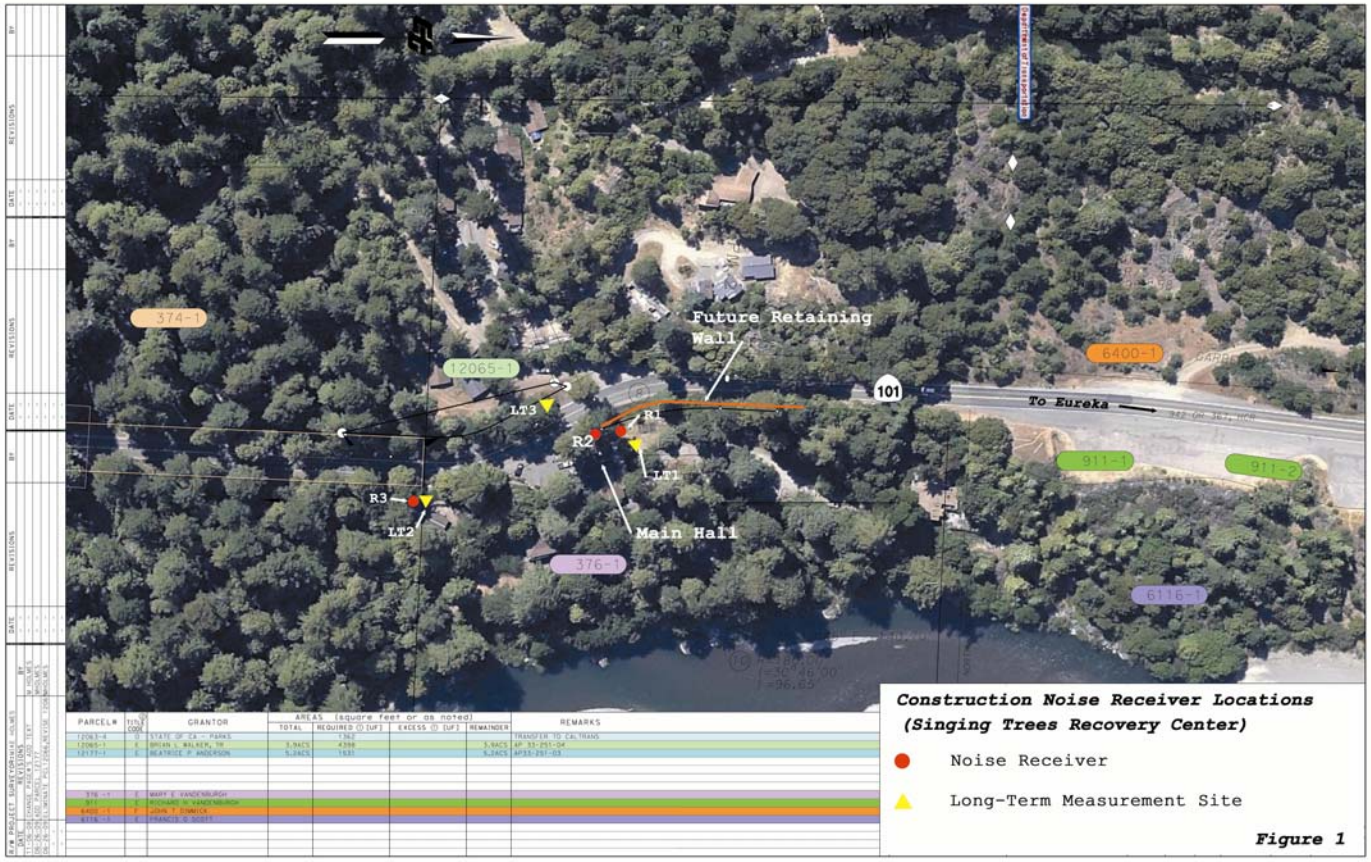


Figure 1 Study Area – Singing Trees Recovery Center

Existing Noise Environment:

Existing noise sources are predominantly highway traffic noise with some intermittent contribution from sources within Singing Trees. The existing noise environment was quantified through modeling utilizing FHWA TNM (Traffic Noise Model) Version 2.5 as well as field noise measurements indicated in Table 3. Long-Term Measurements were performed at 3 locations to establish general noise level trends during the course of evening and daytime hours. Figure 1 illustrates the Long-Term positions while Charts A - C present the results.

TABLE 2

Existing "Worst-Hour" Noise Levels

Receiver	Receiver Description	Noise Level dBA Leq (1hour)
R1	North Face of Main Building	67
R2	East Side of Main Building Immed. Adjacent SR101	69
R3	Residential Cabin Immed. Adjacent SR101	63

Chart A Long-Term Noise Monitoring Site LT-1

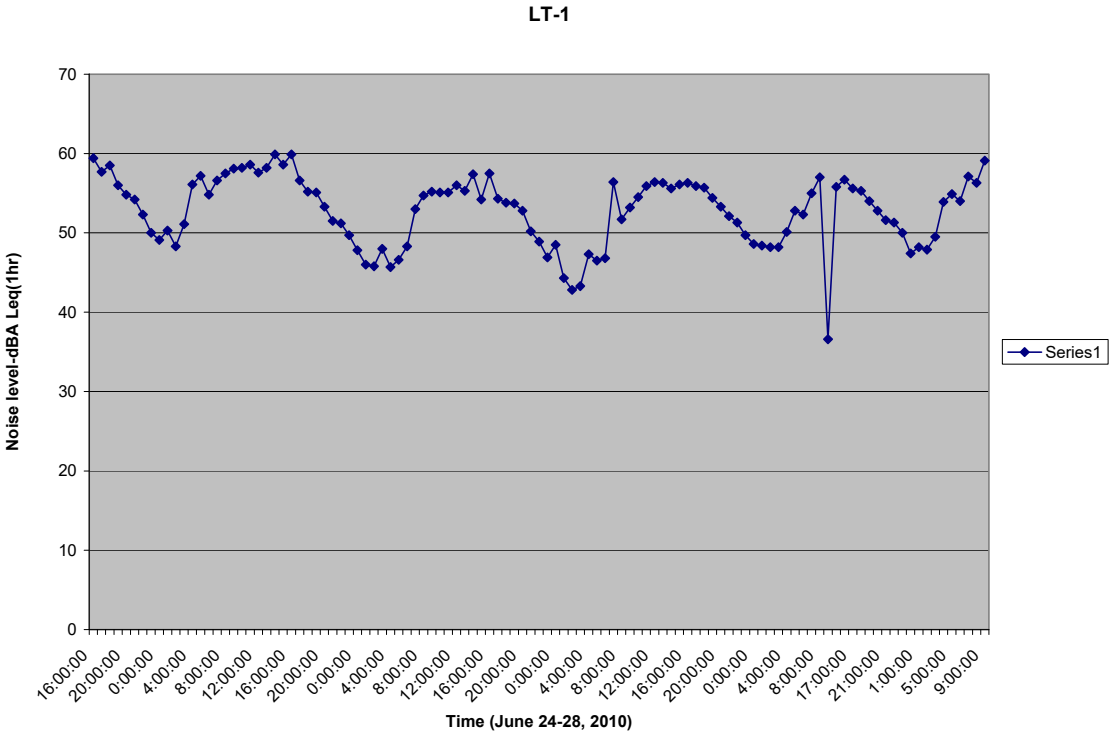


Chart B Long-Term Noise Monitoring Site LT-2

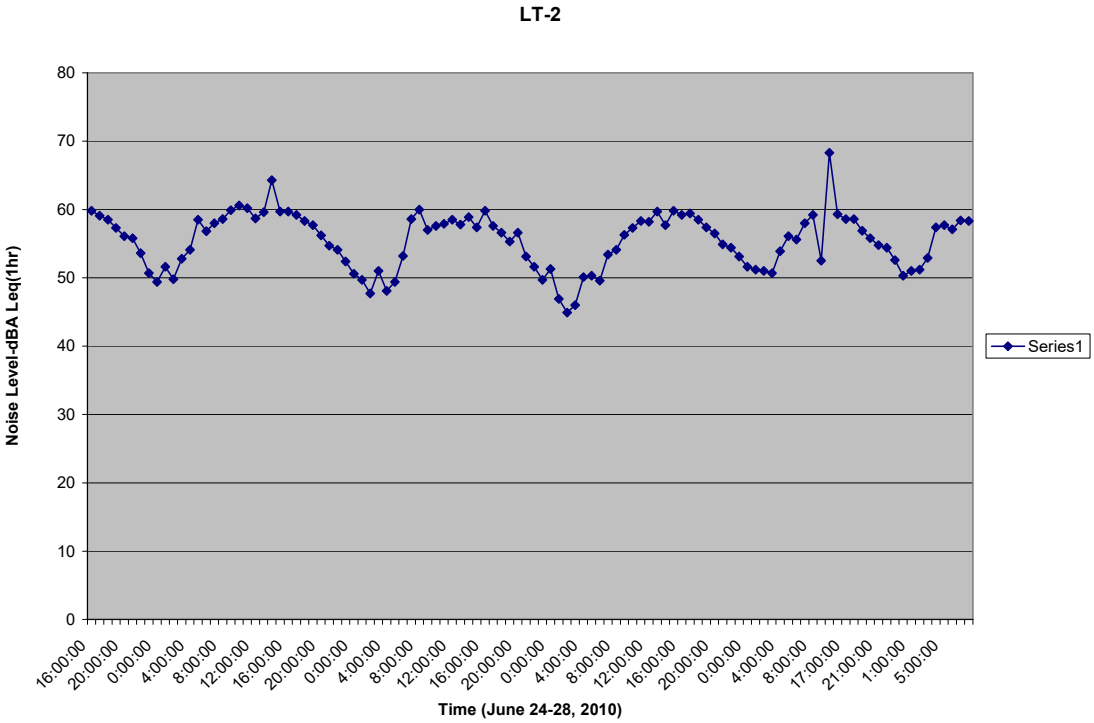
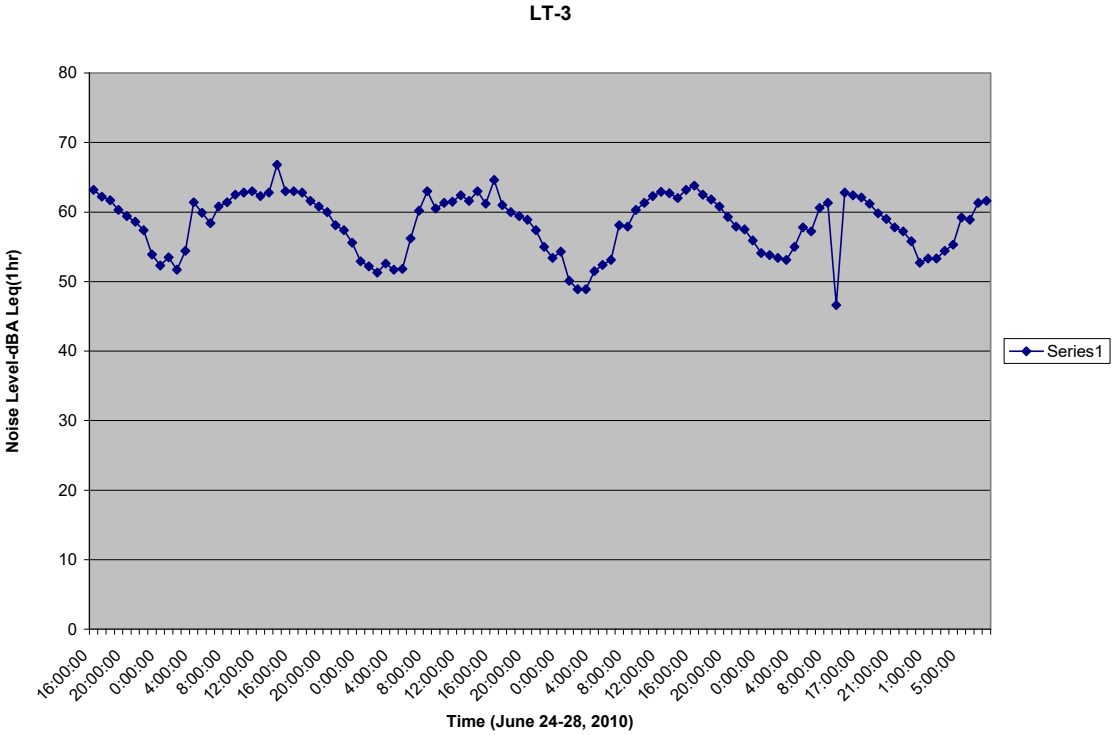


Chart C Long-Term Noise Monitoring Site LT-3



Construction Noise:

During construction noise may be generated from the contractors' equipment and vehicles. Caltrans requires the Contractor to conform to the provisions of Standard Specification, Section 14-8.02 "Noise Control". "Do not exceed 86 dBA LMax at 50 feet from the job site activities from 9 p.m. to 6 a.m.". Equip an internal combustion engine with manufacturer-recommended muffler. Do not operate an internal combustion engine on the job site without the appropriate muffler.

TRAFFIC STAGING AND CONSTRUCTION ACTIVITY NOISE LEVELS

Construction traffic staging is planned which would channel all traffic onto existing southbound 101 lane with a temporary traffic signal controlling directional flow. Construction period traffic noise levels were projected utilizing TNM with channeling and flow considered. Results are summarized in Table.

TABLE 3

Construction Traffic Staging "Worst-Hour" Noise Levels

Receiver	Receiver Description	Noise Levels dBA Leq (1hour)
R1	North Face of Main Building	66
R2	East Side of Main Building Immed. Adjacent SR101	68
R3	Residential Cabin Immed. Adjacent SR101	62

Construction Activities

Construction activities are planned for evening and day time hours. Construction would generate noise and would temporarily increase noise levels at adjacent land uses. Construction-related noise levels are normally highest during the demolition and earthwork phases of construction because of heavy equipment and impact tools required to complete the work. A retaining wall is planned along the northbound R/W line immediately Singing Trees main

building (approximately 33 ft at the nearest point). These phases of construction normally generate the highest noise levels over extended periods of time.

Typical hourly average noise levels resulting from the construction of roadways, sewers, and trenches are about 73 dBA to 82 dBA Leq measured at a distance of 100 feet. There would be variations in construction noise levels on a day-to-day basis depending on the actual activities occurring at the site. Table 4 summarizes the typical range of average noise levels that could be expected during project construction phases.

Table 4
Typical Ranges of Energy Equivalent Noise Levels at 100 Feet, L_{eq} in dBA, at Construction Sites

Phase	Public Works Roads & Highways, Sewers, and Trenches	
	I	II
Ground Clearing	78	78
Excavation	82	72
Foundations	82	82
Erection	73	72
Finishing	78	78

I-All pertinent equipment present at site.
II-Minimum required equipment present at site.
Source: U.S.E.P.A., Legal Compilation on Noise, Vol. 1,p. 2-104, 1973

The FHWA RCNM (Roadway Construction Noise Model) has been utilized to estimate noise levels for specific equipment and construction activities planned at specific locations within Singing Trees Recovery Center. Specific construction equipment planned include: loader, excavator, backhoe, grader, auger drill rig, sand blasting, saws, compressors, jackhammers, vacuum street sweeper, paver, concrete pump trucks and cranes.

Table 5

Noise Levels from Construction at R1(60 ft), R2(33 ft), R3(175 ft) and 100 ft(footnote 2)

Equipment	Avg/Max Noise Levels at 100 ft (dBA)	R1 (60 ft)	R2 (33 ft)	R3 (175 ft)
Front End Loader	69Leq/73Lmax	73Leq/77Lmax	79Leq/83Lmax	64Leq/68Lmax
Excavator	70Leq/74Lmax	75Leq/79Lmax	80Leq/84Lmax	66Leq/70Lmax
Backhoe	67Leq/71Lmax	72Leq/76Lmax	77Leq/81Lmax	63Leq/67Lmax
Compressor	67Leq/71Lmax	72Leq/76Lmax	77Leq/81Lmax	63Leq/67Lmax
Jackhammer	75Leq/82Lmax	80Leq/87Lmax	85Leq/92Lmax	66Leq/73Lmax
Chain Saw	71Leq/78Lmax	75Leq/82Lmax	80Leq/87Lmax	66Leq/73Lmax
Auger Drill Rig	71Leq/78Lmax	76Leq/83Lmax	81Leq/88Lmax	66Leq/73Lmax
Dump Truck	66Leq/70Lmax	71Leq/75Lmax	76Leq/80Lmax	62Leq/66Lmax
Compactor	70Leq/77Lmax	75Leq/82Lmax	80Leq/87Lmax	65Leq/72Lmax
Concrete Mixer Truck	69Leq/73Lmax	73Leq/77Lmax	78Leq/82Lmax	64Leq/68Lmax
Concrete Pump Truck	68Leq/75Lmax	73Leq/80Lmax	78Leq/85Lmax	63Leq/70Lmax
Crane	67Leq/74Lmax	71Leq/79Lmax	76Leq/84Lmax	62Leq/70Lmax
Flat Bed Truck	64Leq/68Lmax	73Leq/69Lmax	74Leq/78Lmax	59Leq/63Lmax
Generator	64Leq/67Lmax	68Leq/71Lmax	73Leq/76Lmax	59Leq/62Lmax
Pickup Truck	65Leq/69Lmax	70Leq/73Lmax	75Leq/79Lmax	60Leq/64Lmax
Pnuematic Tools	76Leq/80Lmax	81Leq/84Lmax	86Leq/89Lmax	71Leq/74Lmax
Rivet Buster/chipping gun	66Leq/73Lmax	70Leq/78Lmax	76Leq/83Lmax	61Leq/68Lmax
Sand Blasting (Single Nozzle)	83Leq/90Lmax	87Leq/94Lmax	92Leq/99Lmax	78Leq/85Lmax
Vacuum Street Sweeper	66Leq/76Lmax	70Leq/80Lmax	75Leq/85Lmax	61Leq/71Lmax
Welder/Torch	64Leq/68Lmax	68Leq/72Lmax	74Leq/78Lmax	59Leq/63Lmax

Footnote 2: Distance are referenced from future retaining wall

Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. Shielding by buildings or terrain can substantially reduce construction noise levels at distant receptors.

Construction Noise Impacts

Noise levels (dBA Leq) for current traffic, construction staging traffic, and construction are summarized in Table 1.

At R2, nearest the edge of traveled way and future retaining wall, hourly average noise levels resulting from specific pieces of equipment range from 73-92 dBA Leq. Less sandblasting maximum noise levels are projected up to 86 dBA Leq.

Construction noise impacts primarily result when construction activities occur during noise-sensitive times of the day (early morning, evening, or nighttime hours), the construction occurs in areas immediately adjoining noise sensitive land uses, or when construction durations last over extended periods of time. Maximum and average noise levels generated by construction activities could temporarily or occasionally exceed the current noise levels at the subject property. Project construction activities are anticipated to affect a particular receiver or group of receivers for a period of time less than one construction season as work progresses along the highway.

Construction Noise Control Measures:

The following additional standard construction noise control measures may be considered for implementation, if feasible and practical, to reduce the effects of construction noise on adjacent land uses.

- a) Limit more severe (saw cutting, jack hammering) noise-generating activities at the construction site or in areas adjacent to the construction site associated with the project in any way to the hours of 7 a.m. to 10:00 p.m.
- b) Require that contractors equip all internal combustion engine driven equipment with intake and exhaust mufflers that are in good condition and appropriate for the equipment.
- c) Require contractors to limit or prohibit idling of internal combustion engines on equipment or vehicles that are not actively involved in construction activities.
- d) Avoid staging of construction equipment within close proximity of sensitive sites and locate all stationary noise-generating construction equipment, such as air compressors and portable power generators, as far practical from existing noise sensitive receptors.
- e) Encourage the contractor to utilize “quiet” air compressors and other stationary noise sources where technology exists.
- f) Designate a “noise disturbance coordinator” who would be responsible for responding to any local complaints about construction noise. The disturbance coordinator would determine the cause of the noise complaint (e.g., starting too early, bad muffler, etc.) and would require that reasonable measures warranted to correct the problem be implemented. Conspicuously post a telephone number for the disturbance coordinator at the construction site and include it in the notice sent to neighbors regarding the construction schedule.
- g) Initiate use of “noise curtains”, “noise tents”, temporary barriers to screen stationary noise generating equipment and/or activities when located immediately adjacent to noise sensitive land use. Utilization of such measures should interrupt the line of sight between sound source and intended receiver and have a STC (Sound Transmission Class) rating of 25 or greater as deemed by the Resident Engineer.

References

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