NOISE IMPACT ANALYSIS

CROWLEY LAKE FISHCAMP EXPANSION PROJECT

MONO COUNTY, CALIFORNIA

Prepared for:

Bauer Environmental & Planning Services
Attn: Sandra Bauer
1271 Tropicana Lane
Santa Ana, CA 92705

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NOISE SETTING

BACKGROUND

Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is 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 intensity. Zero on the decibel scale is the faintest sound detectable by a person with good auditory acuity. The decibel scale is a logarithmic progression designed to allow for comparisons of widely varying sound pressure within an easily manageable range.

Humans perceive each increase of ten decibels to be a doubling of apparent loudness. The perceived loudness between a rural setting at 30 dB versus near a rock concert at 100 dB is a 100+-fold increase. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions by weighting sounds within the range of human sensitivity more heavily (middle A and its higher harmonics) in a process called "A-weighting" written as dB(A). Any further reference to "dB" in this report 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 level that is exceeded over some stated 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 metric called the Community Noise Equivalent Level (CNEL).

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 recommended that the 45 dB CNEL standard be expanded to include all habitable rooms in residential use, included single-family dwelling units. Since normal noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL allows the interior standard to be met without any specialized structural attenuation (dual paned windows, etc.). A noise level of 65 dB is also the level at which ambient noise begins to intrude into the ability to have a quiet conversation. Exterior levels of 65 dB CNEL is therefore the most common noise standard for usable outdoor space in California.

While a moderately loud 65 dB CNEL level might be acceptable in urbanized areas of California, a 65 dB CNEL noise exposure would likely be considered unacceptable in a semi-rural environment such as the community near Crowley Lake. The desirable maximum exterior noise level in rural areas of the state is generally 60 dB CNEL. Traffic noise increases of more than +3 dB CNEL are typically considered a significant impact.

BASELINE NOISE LEVELS

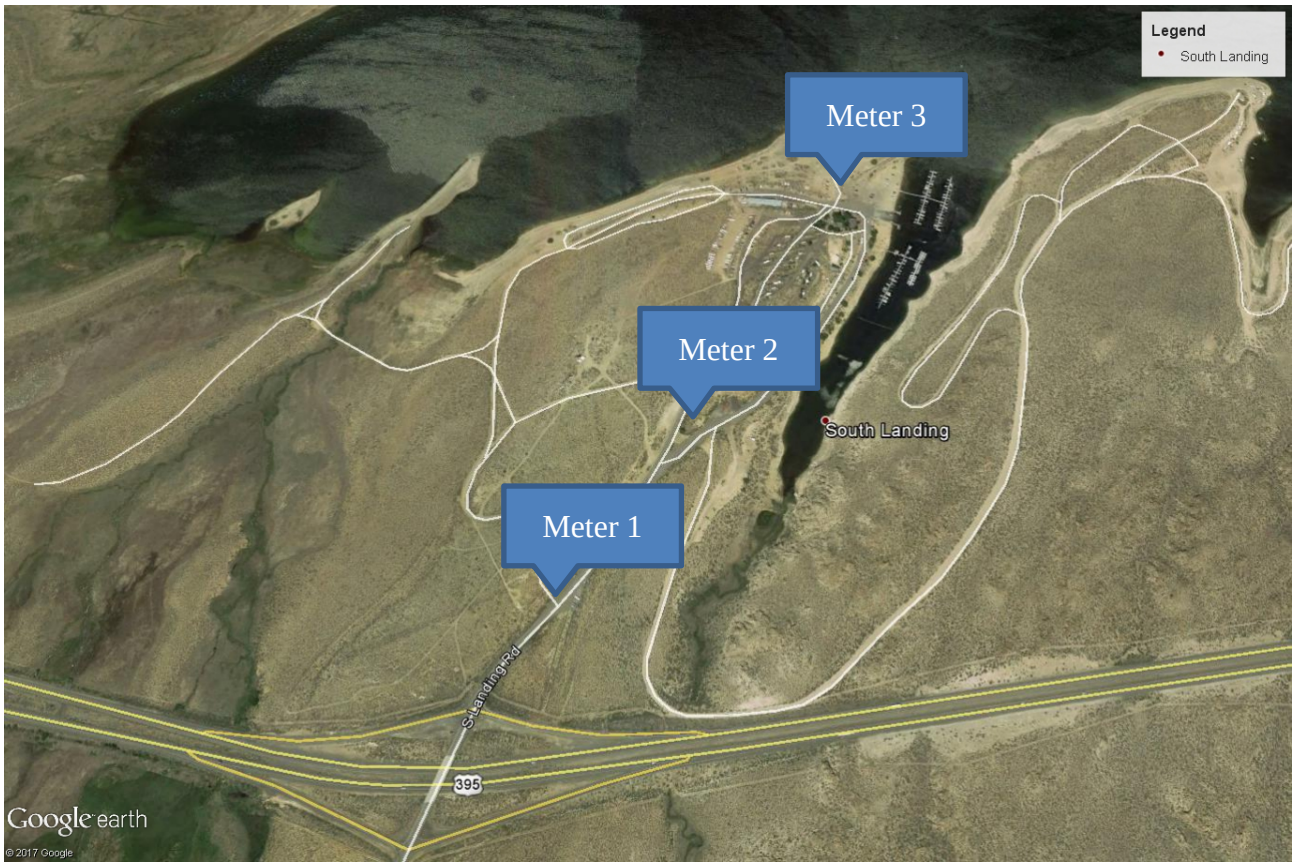
In order to establish an ambient noise level, short term area noise measurements were conducted on Tuesday October 18, 2016 from 3:00 p.m. – 4:30 p.m. at three locations. Measurement locations are shown in **Figure 1** and the monitoring results are summarized below.

Measured Noise Levels (dBA)

	Leq	**Lmax**	**Lmin**	**L10**	**L33**	**L50**	**L90**
Meter 1	45	56	39	45	42	41	40
Meter 2	47	49	40	45	43	42	41
Meter 3	48	55	43	50	48	46	44

Meter 1 was located adjacent to Dry Camp, just north of the gate. Meter 2 was placed about half way into the site and Meter 3 was placed in the RV lot close to the marina. Readings are lowest on the southern portion of the site. They increase slightly traveling north on South Landing Rd. However,
these readings demonstrate that existing ambient noise levels in the project vicinity are low. The low baseline levels do suggest that the proposed project area is sensitive to even a moderate increase in noise that could result from project implementation.

Figure 1
Noise Monitoring Locations



NOISE IMPACTS

Sensitive uses will be subject to incremental increase noise levels from site related traffic and operations. Short-term construction activities may be audible. Because construction is more likely to be performed during warmer months rather than in winter, people are more likely to be outside or to have their windows open when construction is in progress.

THRESHOLDS OF SIGNIFICANCE

Noise impacts are significant if they create a substantial temporary or permanent increase in noise levels, or if they cause a violation of adopted noise/land use compatibility standards in general plans or noise ordinances. The following noise limits are contained in Section 0.16.060 of the Mono County Code.

Maximum Allowable Exterior Noise Levels

Land Use	Allowable Time	Noise Level (dBA)
Residential Single Family	Daytime (7 a.m.-10 p.m.)	55
	Nighttime (10 p.m.-7 a.m.)	50
Residential Multi-Family	Daytime (7 a.m.-10 p.m.)	55
	Nighttime (10 p.m.-7 a.m.)	50
Public Uses-Schools, Libraries, Hospitals	Daytime (7 a.m.-10 p.m.)	55
	Nighttime (10 p.m.-7 a.m.)	50
Passive Recreational Areas	Daytime (7 a.m.-10 p.m.)	55
	Nighttime (10 p.m.-7 a.m.)	50
Community Parks and Athletic Fields	Daytime (7 a.m.-10 p.m.)	55
	Nighttime (10 p.m.-7 a.m.)	50

CONSTRUCTION NOISE SIGNIFICANCE

Mono County limits construction noise to daytime hours of lesser noise sensitivity. In addition, the County Code calls out maximum noise levels that are not to be exceeded at the nearest residence. Construction may not exceed the noise levels in the following schedule (Section 10.16.060 Mono County Code):

a. Mobile Equipment. Maximum noise levels from non-scheduled, intermittent, and short-term operation (less than 10 days) of mobile equipment:

	Single-family Residential (dBA)	**Multi-family Residential (dBA)**	**Semi-residential/ Commercial (dBA)**
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	75	80	85
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	60	65	70

b. Stationary Equipment Maximum noise level for repetitively scheduled and relatively long-term operation (period of 10 days or more) of stationary equipment:

	Single-family Residential (dBA)	**Multi-family Residential (dBA)**	**Semi-residential/ Commercial (dBA)**
Daily, except Sundays and legal holidays, 7:00 a.m. to 8:00 p.m.	60	65	70
Daily, 8:00 p.m. to 7:00 a.m. and all day Sunday and legal holidays.	50	55	60

Construction activities are limited by conditions on grading permits to daytime hours of lesser noise sensitivity. Construction noise generation is temporary, and is prohibited when people are sleeping or most likely to be recreating outside. However, an inability to meet the construction noise standards at the closest sensitive use could create a significant noise impact.

CONSTRUCTION ANALYSIS

Noise levels of construction equipment anticipated for use in this project was obtained. 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 1 identifies highest (L_{max}) 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 L_{eq}. The table is organized by activity and associated equipment.

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 could include equipment such as shown in **Table 1** which describes the noise level for each individual piece of equipment.

Table 1
Noise Levels at 50 foot reference

Activity/Equipment		**Usage Factor[1]**	**Hours of Operation[2]**	**Published Noise @ 50 feet (dB)**	**Actual Measured Noise @ 50 feet (dB)**	**Cumulative Noise Level @ 50 feet (dB))**
Water Tank						
Excavate	Bobcat	40%	3.2	80	79	75
	Loader/Backhoe	37%	3.0	80	78	74
Pour Concrete Pad	Mixer	40%	3.2	80	80	76
	Pump	20%	1.6	82	81	74
	Roller	38%	3.0	85	80	76
Install Tank	Crane	16%	1.3	85	81	73
	Forklift	20%	1.6	75	75	68
	Welder	46%	3.7	73	74	71
Propane Tank						
Excavate	Bobcat	40%	3.2	80	79	75
	Loader/Backhoe	37%	3.0	80	78	74
Pour Concrete Pad	Mixer	40%	3.2	80	80	76
	Pump	20%	1.6	82	81	74
	Roller	38%	3.0	85	80	76
Install Tank	Crane	16%	1.3	85	81	73
	Forklift	20%	1.6	75	75	68
	Welder	46%	3.7	73	74	71
RV Campsites						
Grade and Trench	Bobcat	40%	3.2	80	79	75
	Trencher	20%	1.6	85	81	74
	Loader/Backhoe	37%	3.0	80	78	74
Concrete Pads and Pave	Mixer	40%	3.2	80	80	
	Roller	38%	3.0	85	80	76
	Pump	20%	1.6	82	81	74
Water Service to Dry Camp						
Trench Utilities	Bobcat	40%	3.2	80	79	75
	Trenchers	20%	1.6	85	81	74

Bathroom						
Excavate	Bobcat	40%	3.2	80	79	75
	Loader/Backhoe	37%	3.0	80	78	74
Construct	Mixer	40%	3.2	80	80	76
	Roller	38%	3.0	85	80	76
	Pump	20%	1.6	82	81	74
Construction	Forklift	20%	1.6	75	75	68
	Loader/Backhoe	37%	3.0	80	78	74
Septic Systems						
Excavate	Bobcat	40%	3.2	80	79	75
	Loader/Backhoe	37%	3.0	80	78	74
Install	Crane	16%	1.3	85	81	73
	Loader/Backhoe	37%	3.0	80	78	74
	Welder	46%	3.7	73	74	71
	Forklift	20%	1.6	75	75	68

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. Represents the actual hours of peak construction equipment activity out of a typical 8 hour day

Construction generated noise levels drop off at a rate of about 6 dBA per doubling of distance between the source and receptor. **Table 2** shows the distance from each project component to the nearest residential use across Highway 395 and the associated distance attenuation.

Table 2
Distances to Construction Activity and Associated Noise Attenuation

Element	Distance (miles)	Distance Attenuation (dB)
New Water Tank	0.62	-36
New Propane Tank	0.65	-37
RV Campsites	0.60	-36
Water Service to Dry Camp	0.40	-33
Bathrooms	0.35	-31
Septic Systems	0.60	-36

Table 3 shows the attenuated construction equipment noise level that would be experienced at the closest residence.

Table 3
Construction Equipment Noise Level at Closest Residence

Activity/Equipment		Cumulative Noise Level @ 50 feet (dB)	Cumulative Noise Level @ Closest Home (dB)
Water Tank			
Excavate 1 week	Bobcat	75	39
	Loader/Backhoe	74	38
Pour Concrete Pad 1	Mixer	76	40

week	Pump	74	38
	Roller	76	40
Install Tank 2 days	Crane	73	37
	Forklift	68	32
	Welder	71	35
Propane Tank			
Excavate 1 week	Bobcat	75	38
	Loader/Backhoe	74	37
Pour Concrete Pad 1 week	Mixer	76	39
	Pump	74	37
	Roller	76	39
Install Tank 2 days	Crane	73	36
	Forklift	68	31
	Welder	71	34
RV Campsites			
Grade and Trench 2 weeks	Bobcat	75	39
	Trencher	74	38
	Loader/Backhoe	74	38
Concrete Pads and Pave 2 weeks	Mixer	76	40
	Roller	76	40
	Pump	74	38
Water Service to Dry Camp			
Trench Utilities 2 weeks	Bobcat	75	42
	Trenchers	74	41
Bathroom			
Excavate 1 week	Bobcat	75	44
	Loader/Backhoe	74	43
Pour Pad 2 weeks	Mixer	76	45
	Roller	76	45
	Pump	74	43
Construct 2 weeks	Forklift		37
	Loader/Backhoe	74	43
Septic Systems			
Excavate 3 weeks	Bobcat	75	39
	Loader/Backhoe	74	38
Install 1 week	Crane	73	37
	Loader/Backhoe	74	38
	Welder	71	35
	Forklift	68	32

The anticipated construction fleet is mobile and not stationary and will move about the construction area. The construction noise standard for mobile equipment near an affected residence between 7 a.m. and 8 p.m., Monday through Saturday, is 75 dBA. Although no stationary source equipment is expected to be utilized, the standard is noise 60 dBA during the same hours and would similarly not be exceeded. Noise thresholds will not be exceeded for any construction activity because of distance between the noise source and the closest receptor. The more stringent thresholds for stationary source equipment will be met, although no stationary equipment is anticipated for use.

TRAFFIC NOISE IMPACTS

On a weekend, the project is expected to generate 100 additional vehicular trips. Less project related traffic is anticipated on week-days. If the impact associated with 100 trips per day is not significant, then the weekday impact due to 30 additional trips will meet thresholds with a greater margin of safety.

Vehicles access the site via Highway 395 and then travel north on S Landing Road. S Landing Road is north of Highway 395, and the traffic from the highway would dominate the noise environment. Current traffic volumes along Highway 395 were obtained. In 2015 there were approximately 6,900 vehicles per day on Highway 395 in the project vicinity (Caltrans District 9, Average Annual Daily Traffic (AADT) Count Data for US 395, 2015).

The difference between the noise level associated with 6,900 vehicles and 7,000 vehicles is +0.1 dB. Therefore, the additional vehicles would not alter the traffic noise environment and will not create a perceptible change.

BOAT DOCK OPERATIONAL NOISE

The increase of visitors would presumably lead to extended operation of the boat dock. Noise will be generated from the boats entering or departing the dock. Because the dock area is a “no wake” zone, boat travel speeds will be less than 5 mph. The number of arrivals or departures in any hour for either of the 2 launch areas will be very low. There are no adopted thresholds of significance for boating noise except that moving boats may not create pass-by noise exceeding 55 dB measured at the closest sensitive use. This value is under full power. Within the harbor boats will be near idle maneuvering, the onshore noise level will be much lower. The closest homes, even to the South Landing, is almost 0.5 miles away. The closest home outside the main harbor area is 0.8 miles away. Given that only a few boats will arrive or depart per hour, the hourly Leq will be far below any Mono Country residential standards at homes south of Highway 395.

The public docks will include a boat launch in addition to any arrival/departure activities. The launch or retrieval process is somewhat time-consuming to back the trailer into the water, fasten or unfasten the boat and perform other tasks. The number of boats launched or retrieved per hour is limited. Noise measurements made at a ski boat launch in Plaster City, California, found a noise level of 53 dB Leq for a launch sequence at 30 feet from the ramp. With distance spreading losses, ramp activity noise levels at the closest homes to the marina will be imperceptible at less than 15 dB Leq.

Experience around public docks and launch areas is that possible noise nuisance is more related to onshore social activities than to boating. The proposed park will include camping and will likely have ongoing social activities long after dark. If these activities are fueled by alcohol consumption, boisterous behavior and loud music issues may ensue. The County has restrictions on nuisance noise from parties, but this could be an enforcement issue. The placement of adequate signage and possible time restrictions on some activities is presumed to minimize social activity noise nuisance

potential. Because not everybody may obey all restrictions, surrounding residents should be given information on how to contact law enforcement in that case.

SUMMARY AND MITIGATION

Noise impact mitigation recommendations include:

- Performing construction activities during times of lesser noise sensitivity regulated by ordinance.

Project-related traffic noise changes on existing roadways are less than significant.

Noise associated with increased boating activity will not be perceptible at the closest sensitive use.