PURPLE WINE + SPIRITS
ENVIRONMENTAL NOISE ASSESSMENT

Graton, Sonoma County, California

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INTRODUCTION

This report provides an assessment of noise resulting from operational changes and consolidation at the existing Purple Wine + Spirits facility in the unincorporated Graton area of Sonoma County with regard to the regulatory criteria established by the Sonoma County General Plan Noise Element. Included in a summary of applicable noise regulations, the results of a noise monitoring survey conducted for an earlier version of the project, and an assessment of noise impacts and mitigation measures necessary to meet the applicable County standards at adjacent noise sensitive land uses. Persons not familiar with environmental noise analysis are referred to Appendix A for additional discussion.

PROJECT DESCRIPTION

The existing Purple Wine + Spirits facility, located at 9119 Graton Road, is currently a wine production and distillery facility which processes juice only (no grape crush) with a maximum permitted capacity of 3 million cases per year. The owner proposes to reduce on-site wine and spirits production by 1.5 million cases, while adding a crush pad with approval to crush up to 10,000 tons of grapes per harvest season, in a calendar year.

The crush operations will occur in the central portion of the site, in a covered area between existing buildings. Figure 1 shows the site vicinity, the approximate extents of the property, and primary use areas on the site.

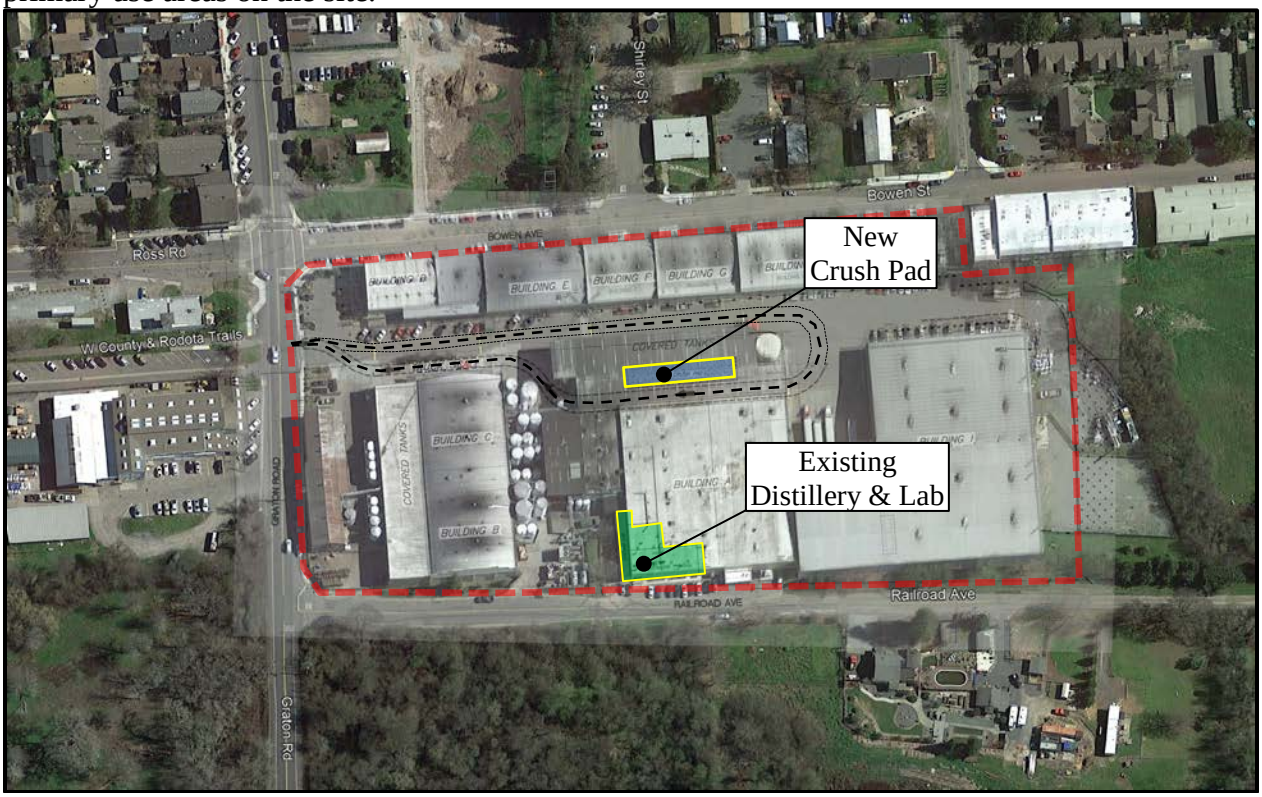


Figure 1: Project Site and Vicinity

REGULATORY BACKGROUND

The Sonoma County Noise Element of the 2020 General Plan identifies a goal to:

> *"Protect people from the adverse effects of exposure to excessive noise and to achieve an environment in which people and land uses function without impairment from noise."*

The following policies, which are applicable for use at the subject project, are intended to achieve this goal:

NE-1c: Control non-transportation related noise from new projects. The total noise level resulting from new sources shall not exceed the standards in Table NE-2 of the recommended revised policies as measured at the exterior property line of any adjacent noise sensitive land use. Limit exceptions to the following:

(1) If the ambient noise level exceeds the standard in Table NE-2, adjust the standard to equal the ambient level, up to a maximum of 5 dBA above the standard, provided that no measurable increase (i.e. +/- 1.5 dBA) shall be allowed.

(2) Reduce the applicable standards in Table NE-2 by five dBA for simple tone noises, noises consisting primarily of speech or music, or for recurring impulsive noises, such as pile drivers and dog barking at kennels.

(3) Reduce the applicable standards in Table NE-2 by 5 decibels if the proposed use exceeds the ambient level by 10 or more decibels.

(4) For short-term noise sources, which are permitted to operate no more than six days per year, such as concerts or race events, the allowable noise exposures shown in Table NE-2 may be increased by 5 dB. These events shall be subject to a noise management plan including provisions for maximum noise level limits, noise monitoring, complaint response and allowable hours of operation. The plan shall address potential cumulative noise impacts from all events in the area.

(5) Noise levels may be measured at the location of the outdoor activity area of the noise sensitive land use, instead of at the exterior property line of the adjacent noise sensitive use where:
   (a) The property on which the noise sensitive use is located has already been substantially developed pursuant to its existing zoning, and
   (b) There is available open land on these noise sensitive lands for noise attenuation.
   This exception may not be used for vacant properties, which are zoned to allow noise sensitive uses

Table 1: Maximum Allowable Noise Exposures for Non-transportation Sources (Table NE-2)

Hourly Noise Metric[1]	Maximum Exterior Noise Level Standards, dBA	
	Daytime: 7 AM to 10 PM	Nighttime: 10 PM to 7 AM
L_{50} (30 minutes in any hour)	50	45
L_{25} (15 minutes in any hour)	55	50
L_{08} (5 minutes in any hour)	60	55
L_{02} (1 minute in any hour)	65	60

1. The sound level exceeded n% of the time in any hour. For example, the L_{50} is the value exceeded 50% of the time or 30 minutes in any hour; this is the median noise level. The L_{02} is the sound level exceeded 1 minute in any hour.

EXISTING NOISE ENVIRONMENT

To quantify the existing noise levels near the property lines of the closest existing and potential noise sensitive (residential) uses, an ambient noise monitoring survey consisting of two long-term and two short-term noise measurements was conducted between 1 pm on Friday, March 31st and noon on Tuesday, April 4th, 2017. The long-term monitoring positions are identified in as LT-1 & LT-2 and the short-term monitoring positions are identified as ST-1 & ST-2 in Figure 2.

All measurements were made using Larson-Davis Laboratories (LDL) precision Type 1 model meters fitted with a ½-inch pre-polarized condenser microphones and windscreens. The time signatures of all meters were synchronized to allow simultaneous measure periods between the

various locations and all meters were calibrated before and after installation with an LDL acoustical calibrator. During the measurement period the weather was clear with no precipitation.

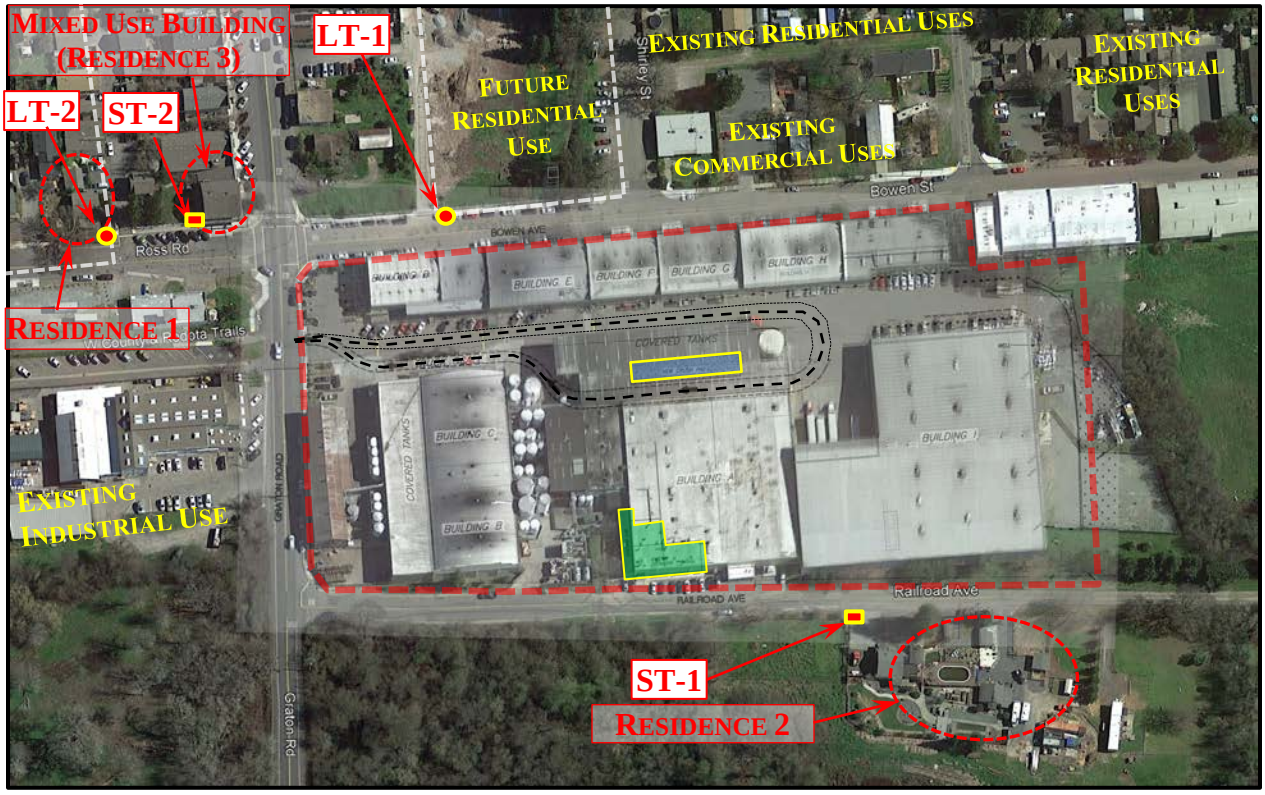


Figure 2: Project Site, Sensitive Uses, and Measurement Locations

The first long-term sound level measurement (LT-1) was made on the property line of the vacant lot on the opposite side of Bowen Street from the project site (as shown in Figure 2). Though this lot was undeveloped at the time of the measurement survey, it is proposed for residential use in the future, and thus is considered the closest (future) residential use to the project site. The monitoring equipment was installed on a utility pole on the property line. Noise levels measured at this site were primarily produced by activities associated with the current uses on the project site, intermittent traffic on Bowen Street, and more distant traffic on Graton Road. The hourly trend in noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 2, 8, 25, and 50 percent of the time (indicated as L_2, L_8, L_{25}, and L_{50}) are shown on Chart 1, following.

The average weekday noise levels ranged from 51 to 71 dBA L_{eq} during the day, and 42 to 64 dBA L_{eq} at night, and average weekend noise levels ranged from 52 to 66 dBA L_{eq} during the day and 38 to 59 dBA L_{eq} at night. The calculated average day/night noise level (L_{dn}) at this location was 61 dBA on weekdays and 60 dBA weekends. The overall L_{dn} at this location was found to be 61 dBA. The average, maximum, minimum levels measured for the daytime and nighttime periods for the entire LT-1 measurement corresponding to the Sonoma County Table NE-2 Noise Standards are shown in Table 2.

Chart 1: Measured Noise Levels at LT-1

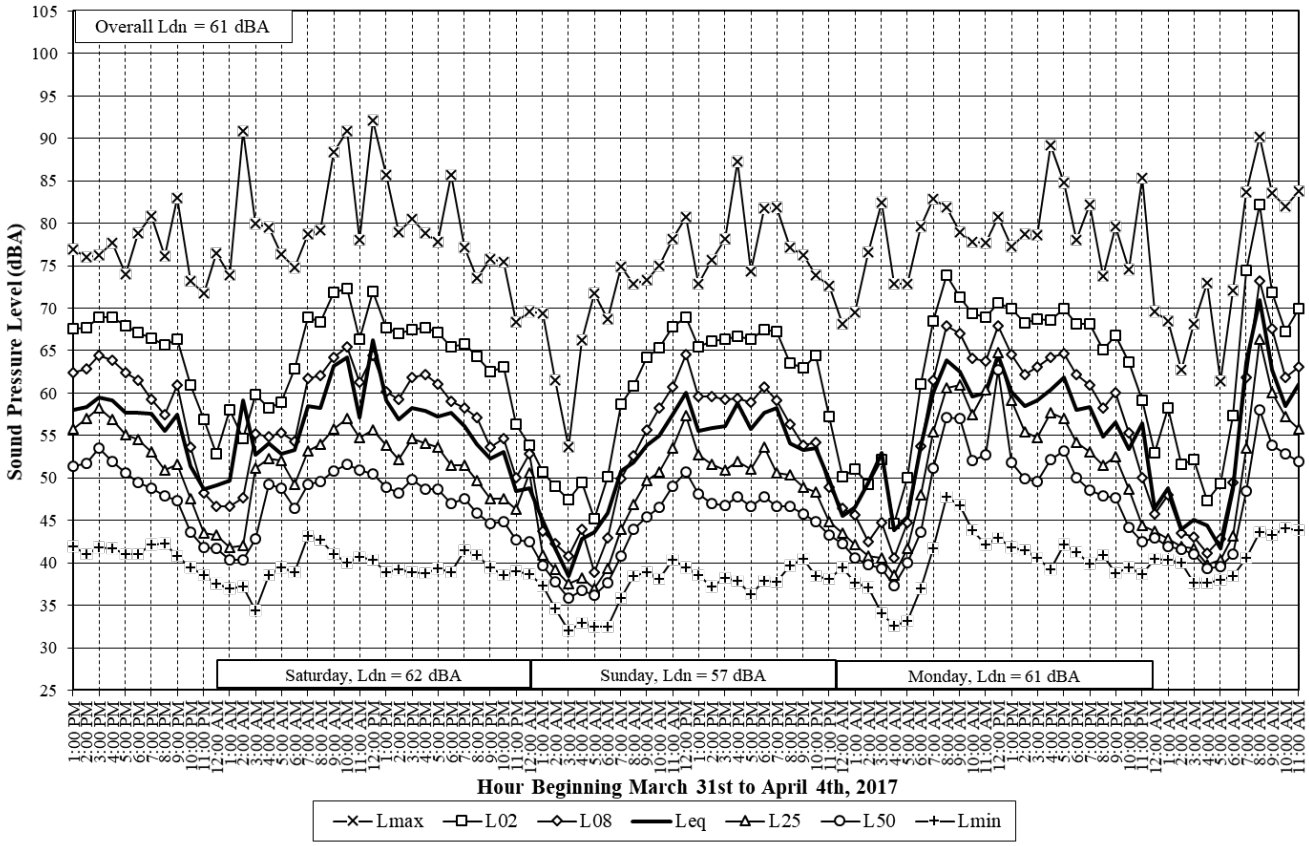
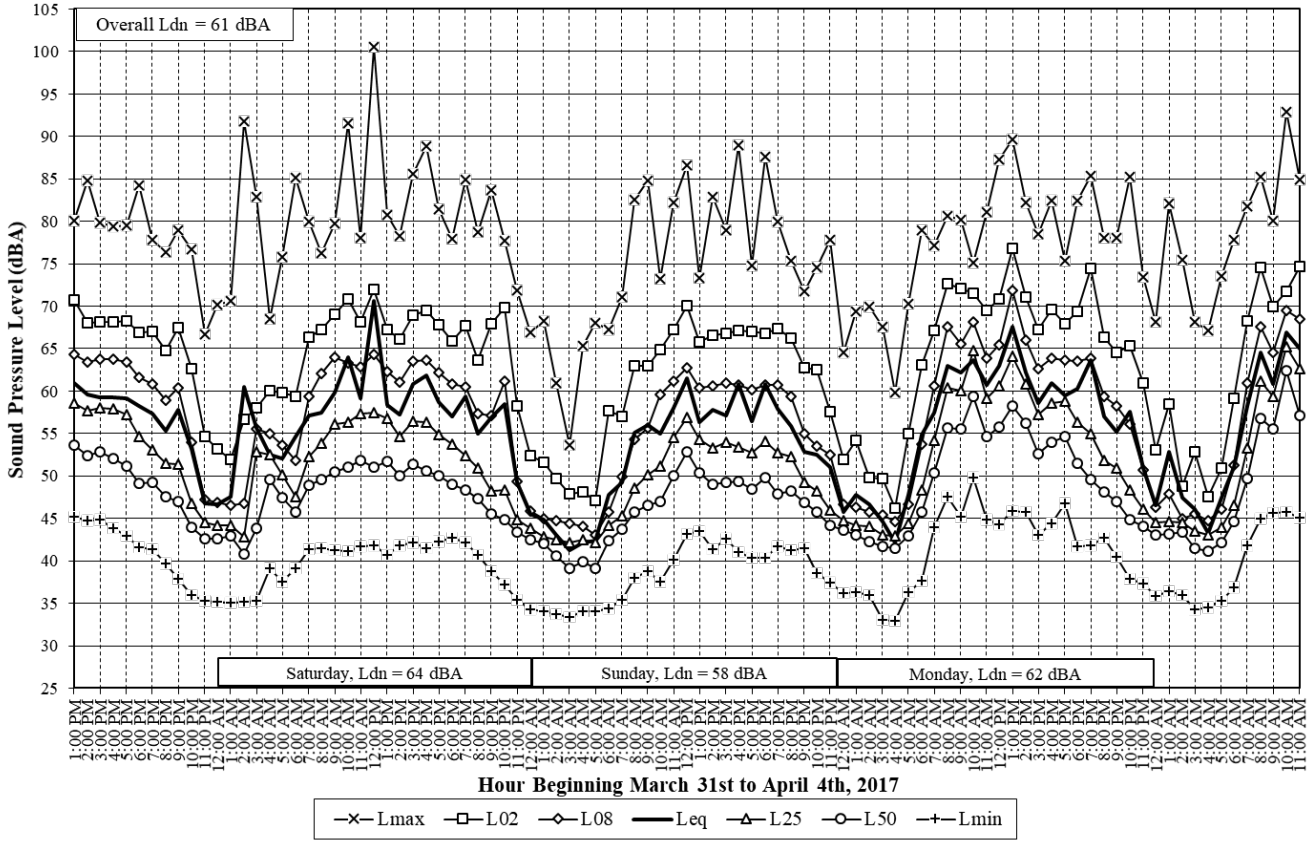


Table 2: Comparison of LT-1 noise measurements results and Sonoma County Standards

Type of Level		Noise Level, dBA			
		L_{50}	L_{25}	L_8	L_2
Daytime Levels	NE-2 Noise Standard	50	55	60	65
	Average of all hourly levels	**50**	**54**	**61**	**68**
	Average of 4 quietest hours	**48**	**52**	**59**	**67**
	Range (Max/Min)	*44/63*	*47/66*	*53/73*	*61/82*
Nighttime Levels	NE-2 Noise Standard	45	50	55	60
	Average of all hourly levels	**42**	**43**	**48**	**54**
	Average of 4 quietest hours	**40**	**42**	**45**	**52**
	Range (Max/Min)	*36/49*	*37/52*	*39/55*	*45/64*

The second long-term sound level measurement (LT-2) was made on at the corner of Ross Road and an unnamed residential/commercial access road at the property line of the nearest existing single-family residence to the project site (Residence 1) as shown in Figure 2. The monitoring equipment was installed on a utility pole on the property line. Noise levels measured at this site were primarily produced by local traffic on Ross and Graton Roads, with some weekday daytime noise produced by minor roadwork occurring at over 100 feet from the measurement site. The hourly trend in noise levels at this location, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the noise levels exceeded 2, 8, 25, and 50 percent of the time (indicated as L_2, L_8, L_{25}, and L_{50}) are shown on Chart 2, following.

Chart 2: Measured Noise Levels at LT-2



The average (L_{eq}) weekday noise levels ranged from 53 to 68 dBA during the day, and 42 to 58 dBA at night, and average (L_{eq}) weekend noise levels ranged from 52 to 71 dBA during the day and 41 to 60 dBA at night. The calculated average day/night noise level (L_{dn}) at this location was 61 dBA on both weekdays and weekends. The overall L_{dn} at this location was found to be 61 dBA. The average, maximum, minimum levels measured for the daytime and nighttime periods for the entire LT-1 measurement corresponding to the Sonoma County Table NE-2 Noise Standards are shown in Table 3.

Table 3: Comparison of LT-2 noise measurements results and Sonoma County Standards

Type of Level		Noise Level, dBA			
		L_{50}	**L_{25}**	**L_8**	**L_2**
Daytime Levels	NE-2 Noise Standard	50	55	60	65
	Average of all hourly levels	**51**	**55**	**62**	**68**
	Average of 4 quietest hours	**49**	**52**	**59**	**66**
	Range (Max/Min)	*44/62*	*47/65*	*54/72*	*63/77*
Nighttime Levels	NE-2 Noise Standard	45	50	55	60
	Average of all hourly levels	**43**	**45**	**49**	**55**
	Average of 4 quietest hours	**42**	**45**	**47**	**52**
	Range (Max/Min)	*39/50*	*42/53*	*43/61*	*46/70*

Short-term noise measurements were made on a 10-minute basis at three locations to evaluate ambient conditions at the property lines of Residences 2 and 3 as shown in Figure 2 based on the

change in noise levels from the long term to the short term position. The measurement locations are described as follows:

- Measurement location ST-1 was made on the property line of the residence to the south and on the opposite side of Railroad Avenue from the distillery.
- Measurement location ST-2 made at the property line of mixed use residence at the corner of Ross and Graton Roads at the set back from Graton Road of the rear outdoor use area of the mixed use building.

The average day-night noise level (L_{dn}) at each short-term measurement location was estimated at this site by correlating the short-term measurement data to the data gathered during the corresponding time period at the long-term sites. Noise levels measured at these sites were produced primarily by roadway traffic. The measurement results and estimated L_{dn} levels at these locations are shown in Table 3, following.

Table 3: Summary of Short-Term Noise Measurement Data, dBA

Noise Measurement Location	L_{50}	L_{25}	L_{08}	L_{02}	L_{max}	L_{dn}
ST-1: Near Property line of Railroad Avenue Residence (Res. 2).	50	54	61	64	76	**60**
ST-2: Property line at rear outdoor use area of Residence 3	59	65	68	71	78	**64**

Note: L_{dn} is approximated by correlation to the corresponding measurement period at the long-term sites.

Based on the noise measurement results the average noise descriptors for the four quietest hours at the near property lines of the closest noise sensitive uses (Residences 1, 2, 3, and 4 in Figure 2) for the daytime and nighttime hours, ambient levels to be used to interpret for the County's Noise Standards were calculated using the measured differences at the long and short-term measurements. The result of this analysis is shown in Table 4.

Table 4: Measured Weekend Noise Levels at adjacent Residential Uses

Hourly Noise Metric	Calculated Exterior Ambient Noise Levels, dBA							
	Residence 1 (LT-2)		Residence 2 (ST-1)		Residence 3 (ST-2)		Future Residences (LT-1)	
	Ave. Daytime Level	Ave. Nighttime Level	Ave. Daytime Level	Ave. Nighttime Level	Ave. Daytime Level	Ave. Nighttime Level	Ave. Daytime Level	Ave. Nighttime Level
L_{50} (30 Min.)	49	42	47	39	51	44	48	40
L_{25} (15 Min.)	52	45	51	40	54	46	52	42
L_{08} (5 Min.)	59	47	57	43	58	47	59	45
L_{02} (1 Min.)	66	52	61	46	62	48	67	52

NOISE ASSESSMENT

Estimating the expected noise produced by, and impacts from, the proposed project at adjacent noise sensitive uses requires three elements; the first is an assessment of what noise producing operations are likely to occur, the second is typical noise source levels for those operations, and the third is to determine the temporal nature of the operations.

I. Identification of Noise Producing operations/uses

There are a number of operations associated with wine and spirits production at the proposed facility that will produce noise. These include:

1. Project truck traffic,
2. Maintenance and forklift operations,
3. Distillery and winery operations and seasonal production activities, and
4. Employee car trips

II. Typical Noise Source Levels

To estimate the noise levels associated with future project operations, some attention must be given to the temporal nature of the noise produced. Below each of the major winery related noise producing operations outlined above are discussed:

Project Truck traffic is expected to primarily access the crush pad in the central area of the site, though some trucks will also access other portions of the site. Noise levels generated by truck traffic are dependent on the size and speed of trucks, typical maximum noise levels generated by heavy duty (semi-tractor trailer type) trucks would be expected to range from 70 dBA when traveling at constant speeds to 75 dBA when stopping/starting and maneuvering at a distance of 50 feet. Typical maximum noise levels generated by medium (box type and delivery) trucks would be expected to range from 60 when traveling at constant speeds to 65 dBA when stopping/starting and maneuvering at a distance of 50 feet.

Distillery, winery and seasonal production operations currently and in the future are expected to produce the following type and range of noise levels:

- Refrigeration equipment, as a maximum condition, is assumed operate under constant conditions day and night. Based on field measurement of winery cooling compressors sound levels from such equipment can produce levels of between 50 dBA to 65 dBA at 50 feet, with L_{50} noise levels of 60 dBA at 50 feet.
- Air compressors, used for various processes in the facility, typically cycle on and off based on the need for compressed air. Based on field measurements of cooling compressors at other wineries, we expect this equipment to produce L_{50} sound levels of 62 dBA at 50 feet.
- Bottling will take place indoors and would be constant on an hourly basis, and given the size of the facility may occur on a regular basis throughout the year. Based on sound level measurements of fixed bottling lines at other wineries, we would expect bottling operations to produce L_{50} sound levels of between 65 and 70 dBA at 50 feet.
- Crush activities will occur only during harvest season, occurring annually for up to 61 days during September and October. The majority of the noise sources associated with the crush include the operation of hoppers, presses, destemmers, separators, crushers, air compressors, forklifts, conveyors, etc. Average noise levels resulting from the crush are typically constant on an hourly basis. Individual pieces of crush-specific equipment such as the separators and destemmers are relatively quiet with sound levels of around 50 dBA L_{eq} at about 50 feet, however the composite crush activities at a moderately sized (~5,000 case) winery typically generate noise levels of about 62 dBA L_{eq}, at a distance of 50 feet from the center of operations. For the proposed 10,000 ton (approximately 650,000 cases) crush facility, I&R estimates that average sound level at 50 feet from the center of operations may increase to about 72 dBA L_{eq}. During the crush discrete maximum noise events from the proposed facility, such as the setting of empty bins, may reach 70 to 80 dBA L_{max} and produce an L_{02} of up to 80 dBA 50 feet from the center of operations.

Maintenance and forklift operations would produce intermittent noise depending on the exact nature of the operation. These would likely occur at a much less than a daily rate although operations may span several hours once initiated. Backup alarms (or beepers), which are repetitive and irritating by design, will also produce noise during these activities, and as with forklift operations themselves are expected to be intermittent by nature. Forklift use and associated backup alarms noise will be attenuated during crush related activities by structures of the surrounding buildings. Based on experience with other winery operations, we estimate that non-attenuated L_{25} noise levels from these operations may reach levels of 66 to 67 dBA at 50 feet.

III. Propagation of sound

The final step in estimating the project noise levels is assessing the propagation of sound to the sensitive receptors. To do this, it is necessary to assume some rate of sound attenuation between the operations and receiver locations. The most dominant physical effect is due to the spreading out of sound waves with distance. For simple, single sources such as fixed equipment and stationary truck operations, the divergence of the sound wave is hemispherical in nature producing a reduction of 6 dB with each doubling of distance. For moving sources of noise, such as auto traffic or truck movements, which are considered linear sources of noise, the divergence of the sound wave is cylindrical in nature producing a reduction of 3 to 4 ½ dB with each doubling of distance. Other effects can modify these fall-off rates such as partial shielding from buildings or topography, atmospheric attenuation of sound, ground absorption, and meteorological effects. These effects almost always reduce the noise in addition to that due to sound divergence. As most of these effects will vary with time due to changing environmental conditions, it is most conservative to assume only attenuation due to divergence for outdoor activities and conservative (minimal) rate of structural attenuation (12 dBA) when operations are conducted within buildings, realizing that the actual noise level will be at or, most likely, below those predicted using this assumption at any one time.

IMPACT ASSESSMENT

Impact 1: Truck Noise

Trucks accessing the Project site and new crush pad are expected to use Graton Road. These roadways currently serve local and through truck traffic, and thus noise generated by individual trucks traveling to and from the site would be expected to produce noise levels similar to those already occurring in the area. Once on the project site, noise from truck operations would be subject to County NE-2 standards.

A review of the site plan and Goggle Earth shows that;

1. Trucks maneuvering on the site in the crush area or in distilled spirits production area will be within about 580, 320, and 500 feet of the respective property lines of Residences 1, 2, and 3, and about 200 feet from the future residential property lines opposite Bowen Street.
2. Trucks on the internal site access driveway traveling at constant speeds will be within about 290, 270, and 230 feet of the respective property lines of Residences 1, 2, and 3, and about 160 feet from the future residences opposite Bowen Street.

Noise from these on-site truck operations at these sensitive receptors in the crush area or in distilled spirits production area would also be shielded by the structures of the intervening on-site buildings. Considering this, the estimated noise shielding from the crush and the distilled spirits production areas to the identified receptors is 10 dBA to the property line of Residences 1 and the outdoor use area property line of Residence 3, and 20 dBA at property lines of Residence 2 and the future residential uses opposite Bowen Street.

Based on these attenuation factors and attenuation due to distance of 6 dB for each doubling of the distance, the highest average noise generated by maneuvering and constant speed trucks on the site would be;

Maneuvering trucks in the crush or distilled spirits production areas:

- Medium trucks at 34 dBA and heavy trucks at 44 dBA at the property line of Residence 1,
- medium trucks at 29 dBA and heavy trucks at 39 dBA at the property line of Residence 2,

- Medium trucks at 35 dBA and heavy trucks at 45 dBA at the property line of the Residence 3 outdoor use area and
- Medium trucks at 33 dBA and heavy trucks at 43 dBA at the future residential property lines opposite Bowen Street.

Constant speed trucks on site access route:

- Medium trucks at 35 dBA and heavy trucks at 45 dBA at the property line of Residence 1,
- Medium trucks at 30 dBA and heavy trucks at 40 dBA at the property line of Residence 2,
- Medium trucks at 37 dBA and heavy trucks at 47 dBA at the property line of the Residence 3 outdoor use area and
- Medium trucks at 35 dBA and heavy trucks at 45 dBA at the (possible) future residential property line opposite Bowen Street.

Considering the large size of the proposed crushing facility, heavy truck operations may occur on site for 15 minute per hour, since it is likely that during crush season multiple heavy trucks would arrive and depart during any given hour. Though medium trucks are expected to operate on site less frequently, to conduct a conservative analysis, this analysis also considers that medium truck operations may also operate on site for 15 minute per hour. Therefore, medium and heavy truck operations on site are evaluated against to the L_{25} NE-2 category. Tables 7, below, presents and summarizes the assessment of medium and heavy truck noise.

Table 7: Truck L_{25} Noise Levels

	L_{25} (Noise Level Exceeded 15 Minutes in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Residential**
Unadjusted Table NE-2 Daytime Limit	55	55	55	55
Unadjusted Table NE-2 Nighttime Limit	50	50	50	50
Daytime Ambient Noise Levels	52	51	54	52
Nighttime Ambient Noise Levels	45	40	46	42
Medium Trucks (MT) on Site	**35**	**29**	**37**	**33**
Heavy Trucks (HT) on Site	**45**	**39**	**47**	**43**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	0	0	0	0
Adjusted Table NE-2 Daytime Limit	55	55	55	55
Adjusted Table NE-2 Nighttime Limit	50	50	50	50
Truck Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Considering the findings shown in Table 7, noise associated with daytime or nighttime truck traffic at the project would not exceed the NE-2 noise standards at the property lines of the adjacent noise sensitive uses.

Mitigation 1: None Needed

Impact 2: Mechanical Equipment Noise (Non-Crush Facilities)

The proposed project will add new or relocate existing noise-generating mechanical equipment such as cooling equipment, air dryers, pumps, and compressors. Some equipment will need to be located outside of structures due to air flow considerations. Considering this possibility and based on a review of the existing and proposed uses on the project site, and distance information obtained via Goggle Earth, under the worst case condition with the equipment located outside and only partially shielded by intervening buildings, the equipment may be as close as 570, 490, and 270 feet from the respective property lines of Residences 1 and 2, the outdoor use area of Residence 3, and 170 feet from residential property line opposite Bowen Street.

Using the source levels discussed above and a 6 dB sound reduction for each doubling of the distance, a minimal noise attenuation factor due to partial building shielding of 5 dBA at Residences 1 and 3, and a 10 dBA attenuation factor due to more complete building shielding at the property line of Residence 2 and the future Residences opposite Bowen Street, the constant L_{50} noise levels from mechanical equipment outside of the winery could produce L_{50} levels of 34 to 36 dBA at the property line of Residence 1, 30 to 32 dBA at the property line of Residence 2, 40 to 42 dBA at the outdoor use area of Residence 3, and 39 to 41 dBA at the property line of the future residences opposite Bowen Street. Table 8, below, presents and summarizes the assessment of mechanical equipment noise versus County Noise Standards.

Table 8: Mechanical Equipment L_{50} Noise Levels

	L_{50} (Noise Level Exceeded 30 Minutes in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Res.**
Unadjusted Table NE-2 Daytime Limit	50	50	50	50
Unadjusted Table NE-2 Nighttime Limit	45	45	45	45
Daytime Ambient Noise Levels	49	47	51	48
Nighttime Ambient Noise Levels	42	39	44	40
Mechanical Equipment Noise at Receiver	**34 to 36**	**30 to 32**	**40 to 42**	**39 to 41**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	-5	0	0	0
Adjusted Table NE-2 Daytime Limit	45	50	50	50
Adjusted Table NE-2 Nighttime Limit	50	45	45	45
Mechanical Equipment Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Considering the findings shown in Table 8, noise associated with outdoor mechanical equipment would not exceed the NE-2 noise standards at the property lines of the adjacent noise sensitive uses.

Mitigation 2: None Needed

Impact 3: Crush Related Noise

The project proposes the addition of a Grape Crushing Facility with capacity to crush up to 10,000 tons of fruit. A review of the project plans indicates that crush activities would take place in the central portion of the site under a cover canopy, in an open area between existing buildings as shown in Figures 1 and 2. Based on this review and distance information obtained via Goggle Earth, the crush pad be situated as close as 580, 320, and 500 feet from the respective property lines of Residences 1 and 2, the outdoor use area of Residence 3, and 200 feet from the property lines of future residences opposite Bowen Street. In this location, crush activities would be well shielded from all surrounding residential uses by intervening, existing, structures on the site. Thus, crush related noise at these surrounding residences would be reduced by an estimated building shielding factor of 15 dBA.

Using the source levels discussed in the preceding section, the building shielding factors above, and a 6 dB sound reduction for each doubling of the distance, crush activities outside of the winery could produce constant L_{50} levels of 36 dBA at the property line of Residence 1, 41 dBA at the property line of Residence 2, 37 dBA at the property line of the Residence 3 outdoor use area, and 45 dBA at the property lines of future residences opposite Bowen Street. Additionally, discrete maximum noise events during crush could produce L_{02} levels of 44 dBA at the property line of Residence 1, 49 dBA at the property line of Residence 2, 45 dBA at the property line of the Residence 3 outdoor use area, and 53 dBA at the property lines of future residences opposite Bowen Street. Tables 9a and 9b, following, present and summarize the assessment of crush related noise versus County Noise Standards.

Table 9a: Crush Related Constant (L_{50}) Noise Levels

	L_{50} (Noise Level Exceeded 30 Minutes in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Res.**
Unadjusted Table NE-2 Daytime Limit	50	50	50	50
Unadjusted Table NE-2 Nighttime Limit	45	45	45	45
Daytime Ambient Noise Levels	49	47	51	48
Nighttime Ambient Noise Levels	42	39	44	40
Crush related Noise at Receiver	**36**	**41**	**37**	**45**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	0	0	0	0
Adjusted Table NE-2 Daytime Limit	50	50	50	50
Adjusted Table NE-2 Nighttime Limit	45	45	45	45
Crush related Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Table 9b: Crush Related Maximum Event (L_{02}) Noise Levels

	L_{02} (Noise Level Exceeded 1 Minute in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Res.**
Unadjusted Table NE-2 Daytime Limit	65	65	65	65
Unadjusted Table NE-2 Nighttime Limit	60	60	60	60
Daytime Ambient Noise Levels	66	61	62	67
Nighttime Ambient Noise Levels	52	46	48	52
Crush related Noise at Receiver	**44**	**49**	**45**	**53**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	0	0	0	0
Adjusted Table NE-2 Daytime Limit	65	65	65	65
Adjusted Table NE-2 Nighttime Limit	60	60	60	60
Crush related Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Considering the findings shown in Tables 9a and 9b, the constant and maximum noise levels associated with crush activities are not expected to exceed daytime and nighttime County NE-2 noise standards at the property lines of the adjacent noise sensitive uses.

Mitigation 3: None Needed

Impact 4: Bottling Noise

All bottling will continue to take place inside on a fixed bottling line in the winery and spirits production area as it does now. This activity could occur as close as 370, 250, and 390 feet from the respective property lines of Residences 1 and 2, the outdoor use area of Residence 3, and 220 feet from the future residential property line opposite Bowen Street. Considering a 6 dB sound reduction for each doubling of the distance and a building shielding factors of 12 dBA bottling may produce constant L_{50} levels of 41 dBA at the property line of Residence 1, 44 dBA at the property line of Residence 2, 40 dBA at the property line of the Residence 3 outdoor use area, and 45 dBA at the future residential property line opposite Bowen Street. Table 10, following, presents and summarizes the assessment of bottling related noise versus County Noise Standards.

Table 10: Bottling Related L_{50} Noise Levels

	L_{50} (Noise Level Exceeded 30 Minutes in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Res.**
Unadjusted Table NE-2 Daytime Limit	50	50	50	50
Unadjusted Table NE-2 Nighttime Limit	45	45	45	45
Daytime Ambient Noise Levels	49	47	51	48
Nighttime Ambient Noise Levels	42	39	44	40
Bottling related Noise at Receiver	**41**	**44**	**40**	**45**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	0	0	0	0
Adjusted Table NE-2 Daytime Limit	50	50	50	50
Adjusted Table NE-2 Nighttime Limit	45	45	45	45
Bottling related Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Considering the findings shown in Table 10, the noise associated with bottling would not exceed County NE-2 noise standards at any adjacent residence.

Mitigation 4: None Needed

Impact 5: Maintenance and Forklift Operational Noise

Forklift and maintenance operations would likely take place in the crush and distillery work areas. Activities within the project buildings themselves receive significant noise shielding from the building and are not analyzed here. Outdoor forklift and maintenance operations are considered a worst-case condition and are analyzed. Considering this, the source levels for this activity discussed previously, and the distances to the closest residential property line discussed for crush related activities, noise from forklift and maintenance operations in crush and receiving areas may result in L_{25} levels of 31 dBA at the property line of Residence 1, 36 dBA at the property line of Residence 2, 32 dBA at the property line of the Residence 3 outdoor use area, and 40 dBA at the property lines of future residences opposite Bowen Street. Table 11, following, presents and summarizes the assessment of bottling related noise versus County Noise Standards.

Table 11: Forklift and Maintenance L_{25} Noise Levels

	L_{25} (Noise Level Exceeded 15 Minutes in any Hour), dBA			
	Res. 1	**Res. 2**	**Res. 3**	**Future Res.**
Unadjusted Table NE-2 Daytime Limit	55	55	55	55
Unadjusted Table NE-2 Nighttime Limit	50	50	50	50
Daytime Ambient Noise Levels	52	51	54	52
Nighttime Ambient Noise Levels	45	40	46	42
Forklift/maintenance noise at Receiver	**40**	**36**	**41**	**32**
Operations Exceed Ambient by 10 dBA?	No	No	No	No
NE-2 Adjustment	0	0	0	0
Adjusted Table NE-2 Daytime Limit	55	55	55	55
Adjusted Table NE-2 Nighttime Limit	50	50	50	50
Forklift/maintenance related Noise Exceeds NE-2?	**No**	**No**	**No**	**No**

Considering the findings shown in Table 11, the noise associated with daytime or nighttime Forklift and/or Maintenance activities would not exceed the NE-2 noise standards at the property lines of the adjacent noise sensitive uses.

Mitigation 5: None Needed

APPENDIX A:
FUNDAMENTAL CONCEPTS OF ENVIRONMENTAL ACOUSTICS

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound may be caused by either its *pitch* or its loudness. *Pitch* is the height or depth of a tone or sound, depending on the relative rapidity (frequency) of the vibrations by which it is produced. Higher pitched signals sound louder to humans than sounds with a lower pitch. *Loudness* is intensity of sound waves combined with the reception characteristics of the ear. Intensity may be compared with the height of an ocean wave in that it is a measure of the amplitude of the sound wave.

In addition to the concepts of pitch and loudness, there are several noise measurement scales that are used to describe noise in a particular location. A decibel (dB) is a unit of measurement that indicates the relative amplitude of a sound. The zero on the decibel scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Sound levels in decibels are calculated on a logarithmic basis. An increase of 10 decibels represents a ten-fold increase in acoustic energy, while 20 decibels is 100 times more intense, 30 decibels is 1,000 times more intense, etc. There is a relationship between the subjective noisiness or loudness of a sound and its intensity. Each 10-decibel increase in sound level is perceived as approximately a doubling of loudness over a fairly wide range of intensities. Technical terms are defined in Table 1. There are several methods of characterizing sound. The most common in California is the A-weighted sound level or dBA. This scale gives greater weight to the frequencies of sound to which the human ear is most sensitive. Representative outdoor and indoor noise levels in units of dBA are shown in Table 2.

Because sound levels can vary markedly over a short period of time, a method for describing either the average character of the sound or the statistical behavior of the variations must be utilized. Most commonly, environmental sounds are described in terms of an average level that has the same acoustical energy as the summation of all the time-varying events. This energy-equivalent sound/noise descriptor is called Leq. The most common averaging period is hourly, but Leq can describe any series of noise events of arbitrary duration.

The scientific instrument used to measure noise is the sound level meter. Sound level meters can accurately measure environmental noise levels to within about plus or minus 1 dBA. Various computer models are used to predict environmental noise levels from sources, such as roadways and airports. The accuracy of the predicted models depends upon the distance the receptor is from the noise source. Close to the noise source, the models are accurate to within about plus or minus 1 to 2 dBA.

Since the sensitivity to noise increases during the evening and at night -- because excessive noise interferes with the ability to sleep -- 24-hour descriptors have been developed that incorporate artificial noise penalties added to quiet-time noise events. The Day/Night Average Sound Level, Ldn, is a measure of the cumulative noise exposure in a community, with a 10 dB penalty added to nighttime (10:00 pm - 7:00 am) noise levels. The Community Noise Equivalent Level, CNEL, is a measure of the cumulative noise exposure in a community, with a 5 dB penalty added to evening (7:00 pm - 10:00 pm) and a 10 dB addition to nocturnal (10:00 pm - 7:00 am) noise levels.

Effects of Noise

Sleep and Speech Interference: The thresholds for speech interference indoors are about 45 dBA if the noise is steady and above 55 dBA if the noise is fluctuating. Outdoors the thresholds are about 15 dBA higher. Steady noise of sufficient intensity; above 35 dBA, and fluctuating noise levels above about 45 dBA have been shown to affect sleep. Interior residential standards for multi-family dwellings are set by the State of California at 45 dBA L_{dn}. Typically, the highest steady traffic noise level during the daytime is about equal to the L_{dn} and nighttime levels are 10 dBA lower. The standard is designed for sleep and speech protection and most jurisdictions apply the same criterion for all residential uses.

TERM	DEFINITIONS
Decibel, dB	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighting filter network. 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. All sound levels in this report are A-weighted, unless reported otherwise.
L_{01}, L_{10}, L_{50}, L_{90}	The A-weighted noise levels that are exceeded 1%, 10%, 50%, and 90% of the time during the measurement period.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
Day/Night Noise Level, L_{dn}	The average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10:00 pm and 7:00 am.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 5 decibels in the evening from 7:00 pm to 10:00 pm and after addition of 10 decibels to sound levels in the night between 10:00 pm and 7:00 am.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Intrusive	That noise which intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.

Definitions Of Acoustical Terms **Table 1**

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Typical structural attenuation is 12-17 dBA with open windows. With closed windows in good condition, the noise attenuation factor is around 20 dBA for an older structure and 25 dBA for a newer dwelling. Sleep and speech interference is therefore possible when exterior noise levels are about 57-62 dBA L_{dn} with open windows and 65-70 dBA L_{dn} if the windows are closed. Levels of 55-60 dBA are common along collector streets and secondary arterials, while 65-70 dBA is a typical value for a primary/major arterial. Levels of 75-

80 dBA are normal noise levels at the first row of development outside a freeway right-of-way. In order to achieve an acceptable interior noise environment, bedrooms facing secondary roadways need to be able to have their windows closed, those facing major roadways and freeways typically need windows with special glass.

At a Given Distance From Noise Source	A-Weighted Sound Level in Decibels	Noise Environments	Subjective Impression
	140		
Civil Defense Siren (100')	130		
Jet Takeoff (200')	120		Pain Threshold
	110	Rock Music Concert	
Diesel Pile Driver (100')	100		Very Loud
	90	Boiler Room	
Freight Cars (50')		Printing Press Plant	
Pneumatic Drill (50')	80		
Freeway (100')		In Kitchen With Garbage	
Vacuum Cleaner (10')	70	Disposal Running	Moderately Loud
	60	Data Processing Center	
Light Traffic (100')	50	Department Store	
Large Transformer (200')			
	40	Private Business Office	Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
	0		

Typical Sound Levels in the Environment & Industry | **Table 2**

ILLINGWORTH & RODKIN, INC./Acoustical Engineers

Annoyance: Attitude surveys are used for measuring the annoyance felt in a community for noises intruding into homes or affecting outdoor activity areas. In these surveys, it was determined that the causes for annoyance include interference with speech, radio and television, house vibrations, and interference with sleep and rest. The Ldn as a measure of noise has been found to provide a valid correlation of noise level and the percentage of people annoyed. People have been asked to judge the annoyance caused by aircraft noise and ground transportation noise. There continues

to be disagreement about the relative annoyance of these different sources. When measuring the percentage of the population highly annoyed, the threshold for ground vehicle noise is about 55 dBA Ldn. At an Ldn of about 60 dBA, approximately 2 percent of the population is highly annoyed. When the Ldn increases to 70 dBA, the percentage of the population highly annoyed increases to about 12 percent of the population. There is, therefore, an increase of about 1 percent per dBA between an Ldn of 60-70 dBA. Between an Ldn of 70-80 dBA, each decibel increase increases by about 2 percent the percentage of the population highly annoyed. People appear to respond more adversely to aircraft noise. When the Ldn is 60 dBA, approximately 10 percent of the population is believed to be highly annoyed. Each decibel increase to 70 dBA adds about 2 percentage points to the number of people highly annoyed. Above 70 dBA, each decibel increase results in about a 3 percent increase in the percentage of the population highly annoyed.