VINEYARD CROSSING SUBDIVISION NOISE ASSESSMENT

Mendocino County, California

August 22, 2017

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Project: 17-042

Introduction

Gullion Inc. has submitted a 123-lot subdivision map in Mendocino County, California, just north of the City Limits of Ukiah, California. The project is located at 156 Lovers Lane and consists of approximately 23.62 acres. The site is bordered by Lovers Lane to the south, Masonite Industrial Road (private) to the north, US Highway 101 to the east, and fallow acreage and active vineyards to the west. The site is gently sloping, with a slight elevation change from 672 feet at the northwest corner to 650 feet at the southeast corner.

A row of single-family homes and four flex residential lots will abut US Highway 101. The homes will take access from within the project site and will have a 10-foot setback for the house and a 20-foot setback for the garage off the front property line with the rear yard backing up to US Highway 101. US Highway 101 has a grade change from the north end of the project site, being significantly lower than the project, to being equal to, or slightly elevated at the southern end of the project site.

This study evaluates the compatibility of the proposed residential uses with the noise environment at the project site. Included in the report are the fundamentals of environmental noise, a summary of the applicable policies contained in the Mendocino County General Plan, and a description of existing noise levels at the project site. The report then summarizes future noise levels expected at the project site and describes measures necessary to reduce noise levels to acceptable levels.

Fundamentals of Environmental Noise

Noise may be defined as unwanted sound. Noise is usually objectionable because it is disturbing or annoying. The objectionable nature of sound could be caused by 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 which are used to describe noise in a particular location. A *decibel (dB)* is a unit of measurement which 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 (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 L_{eq}. The most common averaging period is hourly, but L_{eq} 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 *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. The *Day/Night Average Sound Level* (L_{dn}) is essentially the same as CNEL, with the exception that the evening time period is dropped and all occurrences during this three-hour period are grouped into the daytime period.

TABLE 1 Definition of Acoustical Terms Used in this Report

Term	Definition
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. The reference pressure for air is 20 micro Pascals.
Sound Pressure Level	Sound pressure is the sound force per unit area, usually expressed in micro Pascals (or 20 micro Newtons per square meter), where 1 Pascal is the pressure resulting from a force of 1 Newton exerted over an area of 1 square meter. The sound pressure level is expressed in decibels as 20 times the logarithm to the base 10 of the ratio between the pressures exerted by the sound to a reference sound pressure (e. g., 20 micro Pascals). Sound pressure level is the quantity that is directly measured by a sound level meter.
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure. Normal human hearing is between 20 Hz and 20,000 Hz. Infrasonic sound are below 20 Hz and Ultrasonic sounds are above 20,000 Hz.
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.
Equivalent Noise Level, L_{eq}	The average A-weighted noise level during the measurement period.
L_{max}, L_{min}	The maximum and minimum A-weighted noise level during the measurement period.
L_{02}, L_{08}, L_{25}, L_{50}	The A-weighted noise levels that are exceeded 2%, 8%, 25%, and 50% of the time during the measurement period.
Day/Night Noise Level, L_{dn} or DNL	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 measured in the night between 10:00 pm and 7:00 am.
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.

Source: Handbook of Acoustical Measurements and Noise Control, Harris, 1998.

TABLE 2 Typical Noise Levels in the Environment

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110 dBA	Rock band
Jet fly-over at 1,000 feet		
	100 dBA	
Gas lawn mower at 3 feet		
	90 dBA	
Diesel truck at 50 feet at 50 mph		Food blender at 3 feet
	80 dBA	Garbage disposal at 3 feet
Noisy urban area, daytime		
Gas lawn mower, 100 feet	70 dBA	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60 dBA	
		Large business office
Quiet urban daytime	50 dBA	Dishwasher in next room
Quiet urban nighttime	40 dBA	Theater, large conference room
Quiet suburban nighttime		
	30 dBA	Library
Quiet rural nighttime		Bedroom at night, concert hall (background)
	20 dBA	
		Broadcast/recording studio
	10 dBA	
	0 dBA	

Source: Technical Noise Supplement (TeNS), California Department of Transportation, September 2013.

Regulatory Criteria

The proposed project would be subject to noise-related plans and policies established by Mendocino County. The Noise Section of the Mendocino County General Plan Development Element, adopted in August 2009, sets forth policies related to noise and land use compatibility.

Policy DE-98: The County will protect residential areas and other noise-sensitive uses from excessive noise by doing the following:

1) Requiring that new land uses, new roadways, and other new noise sources do not create unacceptable noise levels on adjacent parcels.
2) Allowing homes or noise-sensitive uses to be developed only in places where existing and projected noise levels will meet the exterior noise guidelines and standards shown in Policies DE-100 and DE-101.
3) Requiring that County decisions which would cause or allow an increase in noise created by stationary or mobile sources (such as development of noise-generating land uses or the construction of new or wider roadways) be informed by a noise analysis and accompanied by noise reduction measures to keep noise at acceptable levels.

Policy DE-99: To implement Policy DE-98, the following shall apply:

1) No new use regulated by the County shall be permitted to generate noise that would cause the ambient noise on any adjacent parcel to exceed the "completely compatible" 24-hour guidelines shown in Policy DE-101 or the 30-minute noise standards in Policy DE-100.
2) The County shall ensure that noise mitigation to achieve a "completely compatible" 24-hour exterior noise level and conformance with the 30-minute exterior noise standard is provided in conjunction with any decision[1] it makes that would cause a violation of item 1) above.
3) Developers of new residential or other noise-sensitive uses which are placed in environments subject to existing or projected noise that exceeds the "completely compatible" guidelines in Policy DE-101 shall be responsible for ensuring that acceptable exterior and interior noise levels will be achieved.
4) The County shall ensure that roadway projects include mitigation measures to maintain at least "tentatively compatible" noise levels as shown in Policy DE-101. Mitigation for roadway noise may be deferred where "tentatively compatible" noise guidelines would be exceeded on vacant lands, but shall be installed as part of the roadway project where the noise would affect existing homes. Deferred mitigation shall be the responsibility of the project which places residential units on vacant lands.
5) Developers of new noise-creating uses shall be responsible for implementing noise reduction techniques either at the source or at the residential use to achieve acceptable exterior and interior noise levels.
6) The County shall be responsible for providing noise mitigation required as the result of County decisions to increase transportation noise standards.

[1] Examples of decisions include: Roadway construction projects, public park construction, General Plan amendments, changes of zone, conditional use permits, and site plan review approval.

7) The County shall seek to obtain noise mitigation from other agencies (including the State of California) required to address the noise impacts of decisions made by those agencies (including, but not limited to, roadway widenings).

Action Item DE-99.1: Apply the State Noise Insulation Standards, zoning and building controls, buffers, sound barriers, traffic controls, and other effective measures to reduce exposure to unsafe and undesired noise sources.

Action Item DE-99.2: Require acoustical studies for:

1) Significant new noise generators,

2) New noise-sensitive uses in noise-impacted areas or near noise generators, or

3) New uses which are proposed to be developed in areas which do not meet the "completely compatible" exterior noise guidelines contained in Policy DE-100 or Policy DE-101.

   If information on the noise environment at a project site is not available, a measurement of the noise environment by a qualified acoustical engineer may be needed to make a determination whether a proposed project complies with the guidelines and standards in Policy DE-100 or DE-101.

Action Item DE-99.3: The County will seek to obtain noise mitigation from other agencies (including the State of California) required to address the noise impacts of decisions made by those agencies (including, but not limited to, roadway widenings and railroad operations).

Policy DE-100: The following are the County's standards for maximum exterior noise levels for residential land uses.

Table 3-J Exterior Noise Level Standards (Levels not to be exceeded more than 30 minutes in any hour)

Land Use Type	Time Period	Maximum Noise Level (dBA)
Single-Family Homes and Duplexes	10 p.m. to 7 a.m.	50
	7 a.m. to 10 p.m.	60
Multiple Residential 3 or More Units Per Building (Triplex +)	10 p.m. to 7 a.m.	55
	7 a.m. to 10 p.m.	60

- Where existing ambient noise levels exceed these standards, the ambient noise level shall be the highest allowable noise level as measured in dBA L_{eq} (30 minutes).

- The noise levels specified above shall be lowered by 5 dB for simple tonal noises (such as humming sounds), noises consisting primarily of speech or music, or for recurring impulsive noises (such as pile drivers, punch presses, and similar machinery).

- The County may impose exterior noise standards which are less restrictive than those specified above, provided that:

    1) The noise impact on the residential or other noise-sensitive use is addressed in an environmental analysis,

    2) A finding is made by the approving body stating the reasons for accepting a higher exterior noise standard, and

    3) Interior noise standards will comply with those identified in Policy DE-103.

Policy DE-101: The following are noise compatibility guidelines for use in determining the general compatibility of planned land uses:

Table 3-K Noise Compatibility Guidelines (Expressed as a 24-hour day-night average or L_{dn})

Land Use	Completely Compatible	Tentatively Compatible	Normally Incompatible	Completely Incompatible
Residential	Less than 55 dBA	55-60 dBA	60-75 dBA	Greater than 75 dBA
Commercial	Less than 65 dBA	65-75 dBA	75-80 dBA	Greater than 80 dBA
Industrial	Less than 70 dBA	70-80 dBA	80-85 dBA	Greater than 85 dBA

See Policy DE-102 for the definitions of these levels of compatibility.

- These guidelines apply to land designated by this General Plan for these uses. Residential, retail, or public parks which have been developed on land designated for other uses shall be subject to the exterior noise guidelines for the land on which they are located.

- Non-residential uses located on residentially designated land shall be subject to the exterior noise guidelines for residential lands.

- All uses on Commercial lands, including non-commercial uses, shall be subject to the standards for Commercial land.

- Land use designations not listed above do not have exterior noise compatibility standards. Land use designations with no exterior noise compatibility standard include office and industrial.

- Standards for public schools are set and enforced by the State of California and are not regulated by the County. Therefore, no standards for public schools are shown in Table 3-K.

Policy DE-102: The following definitions shall be used in combination with the standards in the Noise Compatibility Guidelines shown above.

- "Transportation Noise" consists of noise generated by motor vehicles, trains, and airports.

- "Completely Compatible" means that the specified land use is satisfactory and both the indoor and outdoor environments are pleasant.

- "Tentatively Compatible" means that noise exposure may be of concern, but common building construction practices will make the indoor living environment acceptable, even for sleeping quarters, and the outdoor environment will be reasonably pleasant.

- "Normally Incompatible" means that noise exposure warrants special attention, and new construction or development should generally be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features are included in the design. Careful site planning or exterior barriers may be needed to make the outdoor environment tolerable.

- "Completely Incompatible" means that the noise exposure is so severe that new construction or development should generally not be undertaken.

Policy DE-103: The following are the County's standards for acceptable indoor intermittent noise levels for various types of land uses. These standards should receive special attention when projects are considered in "Tentatively Compatible" or "Normally Incompatible" areas, and new uses shall incorporate design features to ensure that these standards are met.

Table 3-L Maximum acceptable Interior Noise Levels Created by Exterior Noise Levels

Land Use Type	Acceptable Noise Level (dBA Ldn or CNEL)
Residential Living and Sleeping Areas, Daytime	45 dBA
Private School Classrooms	55 dBA
Commercial, Educational, Office, Light and Heavy Industrial, Warehousing	Conform with applicable state and federal workplace safety standards

- Standards for public schools are set and enforced by the State of California and are not regulated by the County.

- Noise created inside a residential home, classroom, or library shall not count toward the acceptable noise levels to be maintained in accordance with this policy.

Policy DE-104: New or expanded uses shall comply with adopted noise standards to ensure minimal impact on established noise-sensitive uses.

Policy DE-105: A 5 dB increase in CNEL or L_{dn} noise levels shall be normally considered to be a significant increase in noise.

Action Item DE-105.1: Adopt standards and requirements for acoustical studies to ensure consistent identification of noise impacts.

Policy DE-106: Individual property owners constructing their own home may decide not to meet exterior or interior noise levels, provided they certify that they are aware of existing and future noise levels and their potential effects.

Action Item DE-106.1: Develop and implement a property owner certification system that includes recordation of certificates with other property records.

Policy DE-107: Distance and landscaping are the preferred methods for address noise created by roadways, railways, and similar sources.

Policy DE-108: Noise barriers should be considered only if proven effective by accompanying noise studies.

Policy DE-109: Noise barriers should be visually attractive, complement the surroundings, and require a minimum of maintenance.

Policy DE-110: Noise barriers along major roadways are generally discouraged to avoid the appearance of 'walled' roadways.

Existing Noise Environment

The project site is located at 156 Lovers Lane and consists of approximately 23.62 acres. The site is bordered by Lovers Lane to the south, Masonite Industrial Road (private) and Orr Springs Road (public) to the north, US Highway 101 to the east, and fallow acreage and active vineyards to the west. The site is gently sloping, with a slight elevation change from 672 feet at the northwest corner to 650 feet at the southeast corner.

A noise monitoring survey was conducted between Tuesday, February 28, 2017 and Thursday, March 2, 2017 to quantify the existing noise environment at the project site resulting from vehicular traffic along US Highway 101 and other nearby roadways. The survey consisted of one long-term noise measurement (LT-1) and six short-term noise measurements (ST-1 through ST-6) as indicated in Figure 1. These noise measurements were conducted with Larson Davis Laboratories (LDL) Type I Model 820 Sound Level Meters fitted with a ½-inch pre-polarized condenser microphones and windscreens. The internal clocks of the sound level meters were synchronized for simultaneous measurements, and each sound level meter was calibrated with a Larson Davis Model CA250 precision acoustic calibrator prior to and following the measurement survey.

Noise measurement LT-1 was made approximately 110 feet from the centerline of US Highway 101 near the westernmost boundary of the project site. The noise data collected at LT-1, including the energy equivalent noise level (L_{eq}), maximum (L_{max}), minimum (L_{min}), and the statistical noise levels (noise levels exceeded 1, 10, 50, and 90 percent of the time) are shown in Figures 2 through 4, following. A review of the long-term data indicates that the noise levels at site LT-1 follow a diurnal pattern, such that daytime noise levels increase with daytime activities, particularly those

associated with increased traffic volumes along US Highway 101. Average noise levels at the measurement location during daytime hours typically ranged from 72 to 79 dBA L_{eq}. At night, average noise levels typically ranged from 66 to 76 dBA L_{eq}. The L_{dn} on Wednesday, March 1, 2017 was 79 dBA.

Short-term noise measurements were made during the afternoons of Tuesday, February 28, 2017 and Thursday, March 2, 2017. The internal clocks of the sound level meters were synchronized for simultaneous measurements in order to estimate L_{dn} noise levels at each of the short-term measurement sites. Table 3 summarizes the short-term noise measurements made to complete the noise survey. At each of the short-term noise monitoring sites, vehicular traffic along US Highway 101 was the predominant noise source. Only one slow moving truck was observed along the Masonite Industrial Road during the short-term monitoring periods on February 28, 2017 and March 2, 2017.

TABLE 3 Summary of Short-Term Noise Measurement Data

Noise Measurement Location	Date, Time	L_{max}	$L_{(1)}$	$L_{(10)}$	$L_{(50)}$	$L_{(90)}$	$L_{eq(10)}$	L_{dn}[a]
ST-1: Lot 122	2/28/2017, 13:20-13:30	57	55	53	50	48	51	53
ST-2: Lot 103	2/28/2017, 13:50-14:00	61	59	58	56	54	56	58
ST-3: Lot 40	2/28/2017, 14:20-14:30	73	71	60	58	56	60	61
ST-4: Lot 74	3/2/2017, 14:30-14:40	69	68	66	63	59	64	65
ST-5: Lot 66	3/2/2017, 14:50-15:00	68	64	61	57	55	58	60
ST-6: Lot 56	3/2/2017, 15:10-15:20	77	73	69	65	60	66	68

[a] L_{dn} was approximated by correlating to corresponding period at long-term site.

Noise and Land Use Compatibility Assessment

Future Exterior Noise Environment

The future noise environment at the project site would continue to result primarily from vehicular traffic along US Highway 101. Traffic noise from Orr Springs Road, Lovers Lane, and infrequent, low-speed trucks along Masonite Industrial Road would also contribute to noise levels along the north and south boundaries of the site.

Traffic noise levels were calculated with FHWA's Traffic Noise Model (TNM v.2.5). TNM predicts noise levels assuming calm wind conditions with moderate temperatures and humidity. Roadway, barrier, terrain features, and receptor locations were digitized and input into the traffic noise model in a three-dimensional reference coordinate system. The geometrical input was based on the project's Lot Layout Plan dated June 9, 2017. Topographical data for the site and

surrounding areas was not available at the time of the analysis, so data from Google Earth was input into the model. Roadway traffic volumes, including the vehicle mix ratio, and traffic speeds were also input into the model.

Noise levels were calculated at the study's short-term noise monitoring locations. Calculated noise levels at noise measurement sites are representative of the noise environment expected at portions of the project site that would have direct line-of-sight to adjacent roadways. Receptors along US 101 were placed in the center of private outdoor use areas at a height of 5 feet above the ground.

Exterior noise levels at private outdoor activity areas of new residences are required to be maintained at or below 60 dBA L_{dn} in order to be considered "Tentatively Compatible" with the noise environment. As shown in Table 4, future noise levels at residential land uses nearest US Highway 101 are calculated to reach 66 to 68 dBA L_{dn} (see ST-4, ST-5, and ST-6) at unshielded first-floor exposures. Exterior noise levels at second row residences (see ST-1, ST-2, and ST-3) are calculated to range from 54 to 58 dBA L_{dn}.

TABLE 4 Traffic Noise Modeling Results (dBA, L_{dn})

Location	No Barrier	6-foot Barrier	8-foot Barrier	10-foot Barrier	12-foot Barrier	14-foot Barrier	16-foot Barrier
ST-1: Lot 122	54	54	54	53	53	51	51
ST-2: Lot 103	56	56	55	53	53	52	51
ST-3: Lot 40	58	57	56	55	54	53	53
ST-4: Lot 74	68	63	60	58	57	55	54
ST-5: Lot 66	68	64	60	58	57	56	54
ST-6: Lot 56	66	62	60	58	56	55	54

Methods available to reduce exterior noise levels in outdoor use areas include the construction of sound walls, site planning alternatives (e.g., increased setbacks or relocating the backyards and using the proposed residential structures as noise barriers), or a combination of the above. An 8-foot noise barrier would be required along the easternmost boundary of the site in order to reduce traffic noise levels at private rear yard areas of residences on Lots 53 through 76 to just meet the "Tentatively Compatible" noise level threshold of 60 dBA L_{dn}. A 10-foot noise barrier could be considered in order to reduce noise levels below 60 dBA L_{dn} with an adequate margin of safety. Minimum 6-foot noise barriers would also be required to reduce exterior noise levels at the private rear yard areas of residences on Lots 77 through 87 in order to reduce traffic noise levels from Orr Springs Road and infrequent truck noise levels from Masonite Industrial Road to below 60 dBA L_{dn}. Residences on Lots 1, 2, and 48 through 52 would face Lovers Lane and private rear yard areas would be shielded by the residential units themselves. Noise barriers should be solid from grade to top, with no cracks or gaps, and have a minimum surface density of 3 lbs/ft^2. Suitable barrier materials include one-inch nominal thickness wood fence board, ½-inch laminated glass,

concrete masonry units (CMU), and masonry block. Earth berms of sufficient height would provide equivalent noise level reductions. A preliminary barrier plan is provided in Figure 5. The final heights and limits of noise barriers should be confirmed when the final site plan and grading plan are available.

Future Interior Noise Environment

Interior noise levels within new residential units are required to be maintained at or below 45 dBA L_{dn}. Residential buildings at the north, east, and south boundaries of the project site would be exposed to future noise levels greater than 60 dBA L_{dn}, and the highest future noise exposures would occur nearest US Highway 101 (Lots 53 through 76) and would range from 68 to 71 dBA L_{dn} at unshielded second-story facades, if proposed. Interior noise levels would vary depending on the final design of the buildings (relative window area to wall area) and construction materials and methods. Standard residential construction provides approximately 15 dBA of exterior to interior noise reduction, assuming the windows are partially open for ventilation. Standard construction with the windows closed provides approximately 20 to 25 dBA of noise reduction in interior spaces.

In exterior noise environments ranging from 60 dBA L_{dn} to 65 dBA L_{dn}, interior noise levels can typically be maintained below County standards with the incorporation of an adequate forced air mechanical ventilation system in each residential unit. It is assumed that standard thermal-pane residential windows/doors with a minimum rating of STC 28 would be installed in these residences.

In noise environments of 65 dBA L_{dn} or greater, a combination of forced-air mechanical ventilation and sound-rated construction methods is often required to meet the interior noise level limit. Attaining the necessary noise reduction from exterior to interior spaces is readily achievable in noise environments less than 75 dBA L_{dn} with proper wall construction techniques following California Building Code methods, the selections of proper windows and doors, and the incorporation of forced-air mechanical ventilation systems. Preliminary calculations show that it is likely that windows/doors with ratings of STC 32 would be required at unshielded residential facades adjacent to US Highway 101 assuming a 30% window to wall area ratio.

The following measures shall be included in the design of the project:

- Provide a suitable form of forced-air mechanical ventilation, as determined by the local building official, so that windows can be kept closed at the occupant's discretion to control interior noise and achieve the interior noise standards.

- Provide sound rated windows and doors (minimum STC 32) to maintain interior noise levels at acceptable levels. Additional treatments may include, but are not limited to, sound rated wall construction, acoustical caulking, insulation, acoustical vents, etc. Large windows and doors should be oriented away from the US Highway 101 where possible. Bedrooms should be located away from US Highway 101 where possible.

- Confirm the final specifications for noise insulation treatments during final design of the project. Results of the analysis, including the description of the necessary noise control treatments, will be submitted to the County along with the building plans and approved prior to issuance of a building permit.

FIGURE 1 Aerial Image of Project Site Showing Noise Monitoring Locations

Noise Levels at Noise Measurement Site LT-1
~ 110 feet from the Center of U.S. Highway 101
Tuesday, February 28, 2017

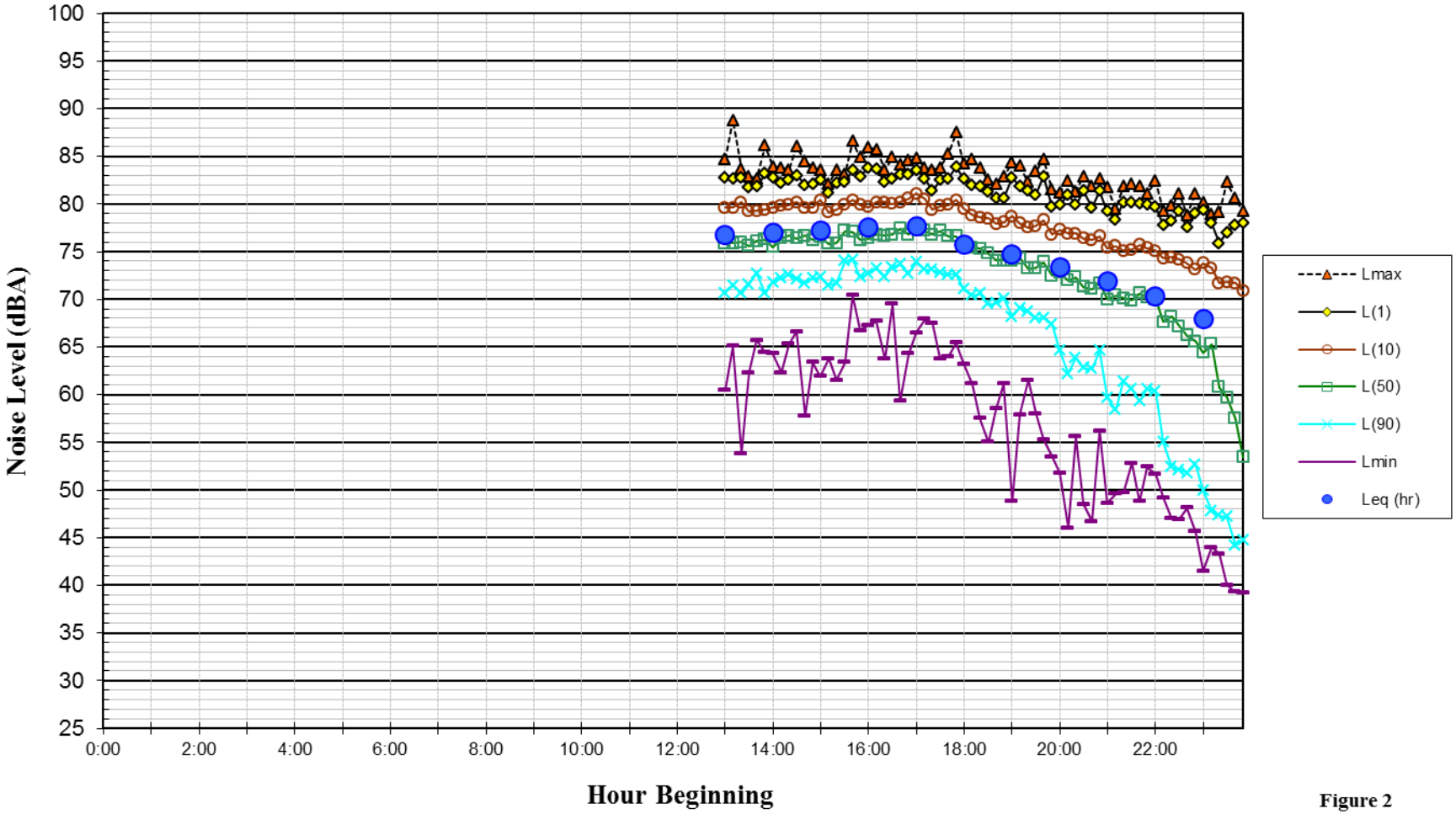
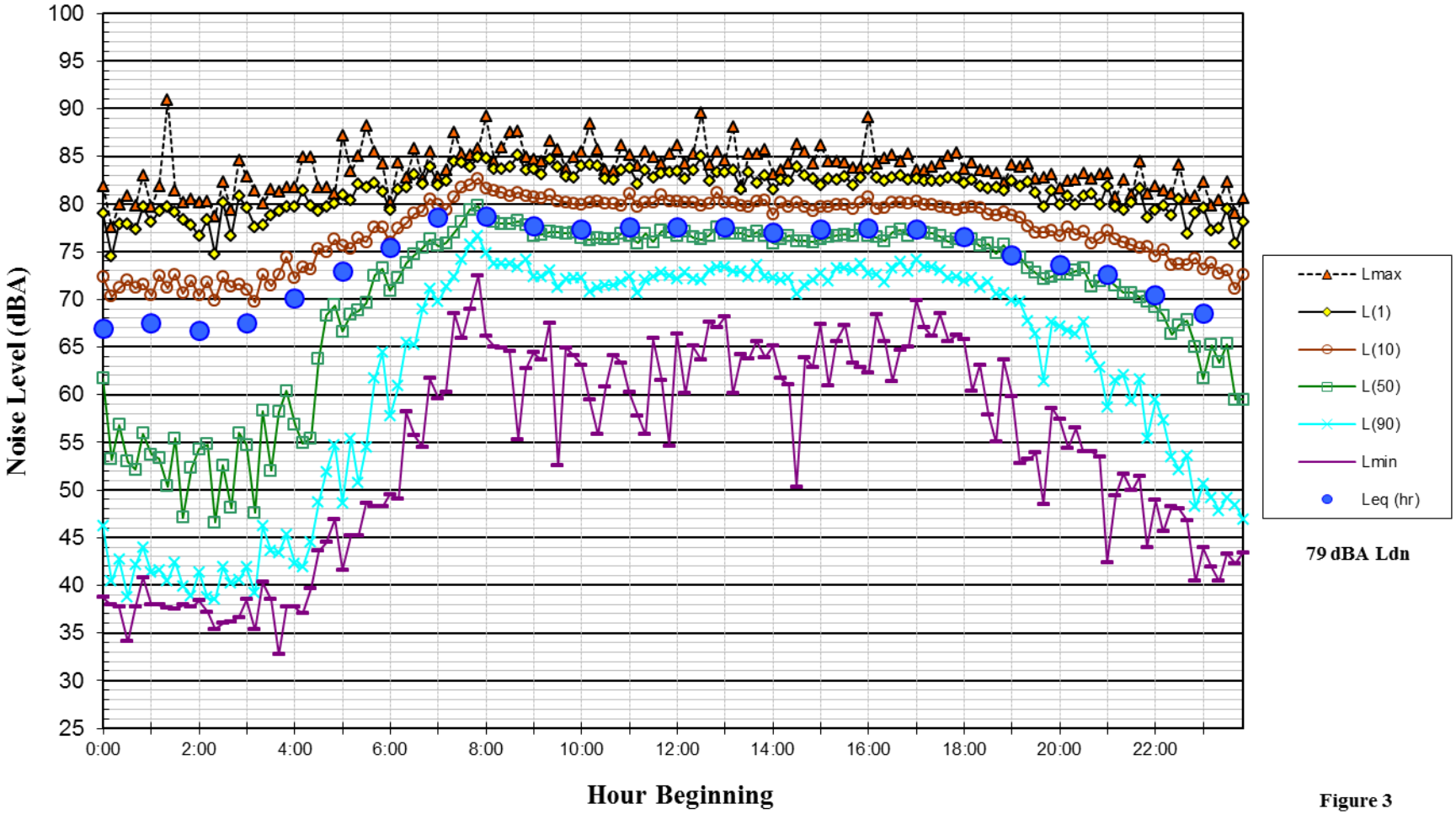


Figure 2

Noise Levels at Noise Measurement Site LT-1
~ 110 feet from the Center of U.S. Highway 101
Wednesday, March 1, 2017



79 dBA Ldn

Figure 3

Noise Levels at Noise Measurement Site LT-1
~ 110 feet from the Center of U.S. Highway 101
Thursday, March 2, 2017

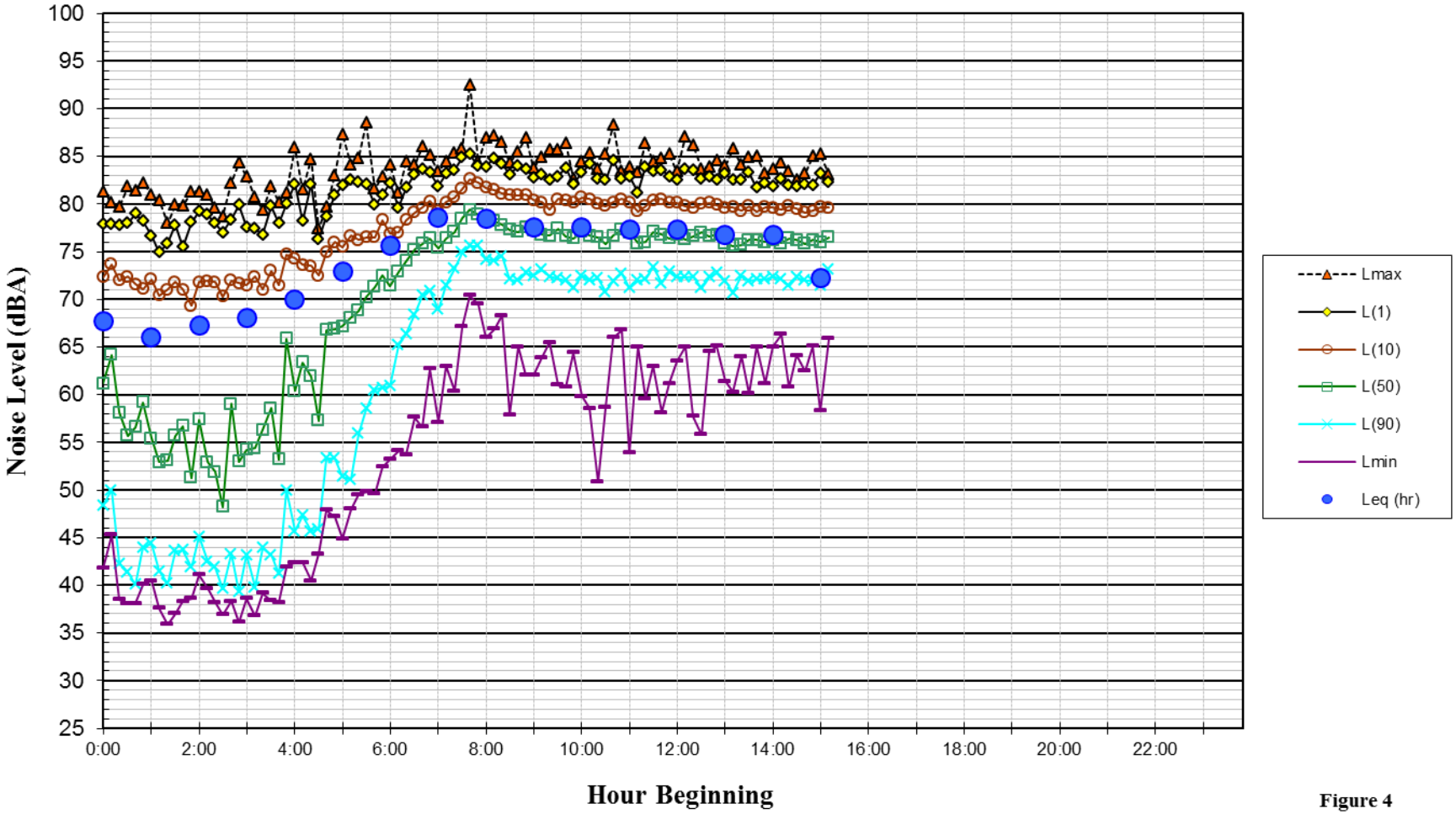


Figure 4

FIGURE 5 Preliminary Noise Barrier Plan