APPENDIX F

Noise

Environmental Noise Analysis

The Village at Loomis

Loomis, California

BAC Job # 2014-298

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Introduction

The Village at Loomis Project is an approximately 66-acre mixed-use residential and commercial project. The vacant project area is located north and northeast of Interstate 80 (I-80) at the Horseshoe Bar Road interchange and is bounded by Horseshoe Bar Road and Laird Street to the west; the Silver Ranch, Sun Knoll, and Day Avenue neighborhoods to the north; I-80 to the east-southeast; and the Raley's Shopping Center to the south. The project area is proposed to be developed with 301 single-family detached residential units, 125 multifamily units, 56,000 square feet of commercial uses, and 25,000 square feet of office uses. The project also includes over 11 acres of open space and public parks. Three roads are proposed for access to the project site, namely Library Drive, Gates Drive off Laird Street, and Doc Barnes Drive.

Dudek has retained Bollard Acoustical Consultants, Inc. (BAC) to prepare this noise study report identifying existing noise sources within or affecting the project area, quantifying baseline ambient noise conditions within the project area, and identifying noise impacts and mitigation measures associated with development within the project area. It is intended that information contained in this report will be utilized in the development of the Noise Section of the Environmental Impact Report (EIR) to be prepared for the project.

Acoustical Fundamentals and Terminology

The Decibel

Noise is simply described as unwanted sound. Sound is defined as any pressure variation in air that the human ear can detect. If the pressure variations occur frequently enough (at least 20 times per second), they can be heard and are called sound. The number of pressure variations per second is called the frequency of sound, and is expressed as cycles per second, called Hertz (Hz).

Discussing sound directly in terms of pressure would require a very large and awkward range of numbers. To avoid this, the decibel (dB) scale was devised. The decibel scale uses the hearing threshold (20 micropascals of pressure), as a point of reference, defined as 0 dB. Other sound pressures are compared to the reference pressure and the logarithm is taken to keep the numbers in a practical range. The dB scale allows a million-fold increase in pressure to be expressed as 120 dB.

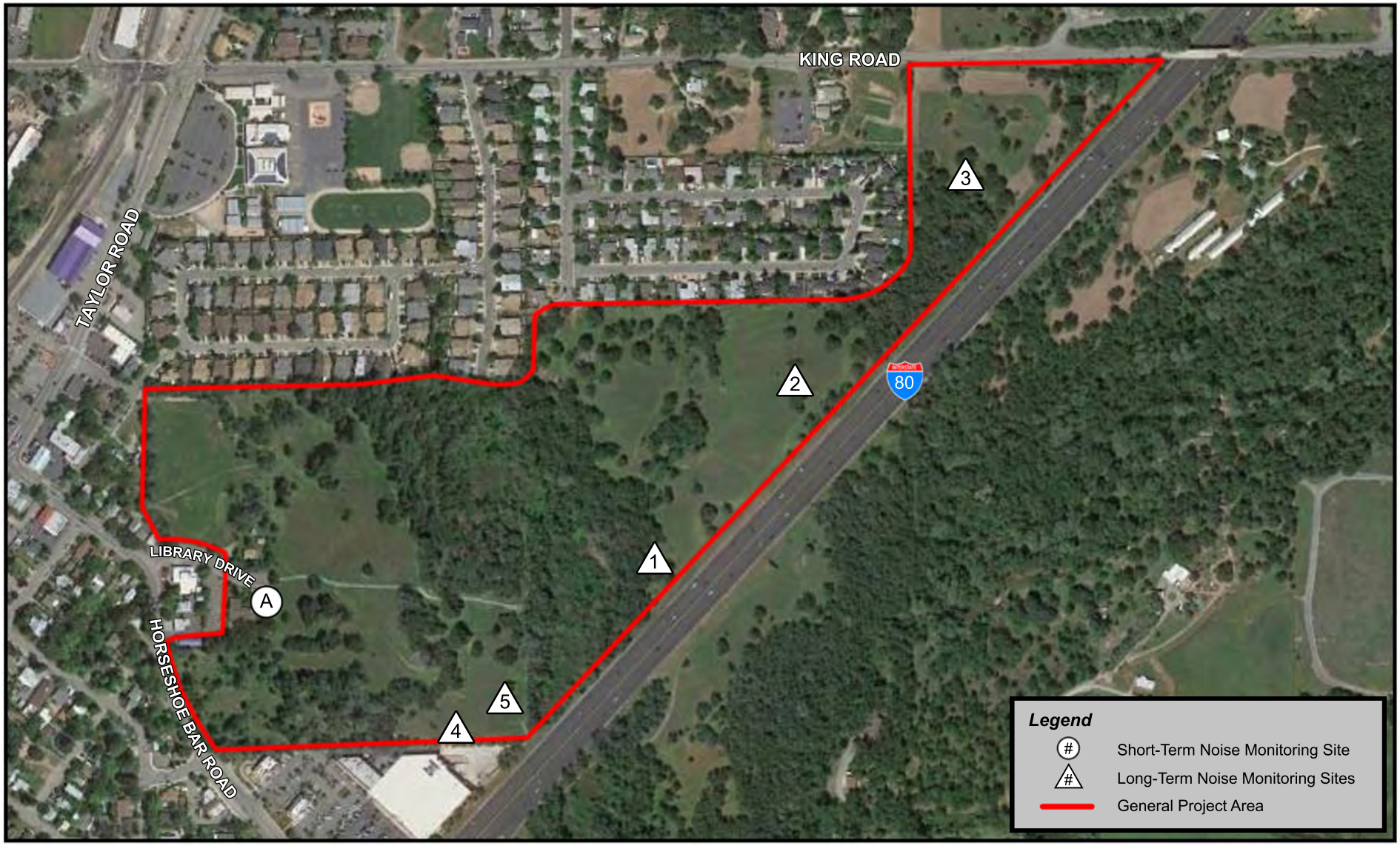
A-Weighting

To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. There is a strong correlation between the way humans perceive sound and A-weighted sound levels. For this reason, the A-weighted sound level has become the standard tool of environmental noise assessment for community exposures. All sound levels expressed in this section are A-weighted sound levels, unless noted otherwise. Definitions of acoustical terminology are provided in Appendix A.

Figure 1

Project Area and Ambient Noise Measurement Locations

Village at Loomis - Loomis, California



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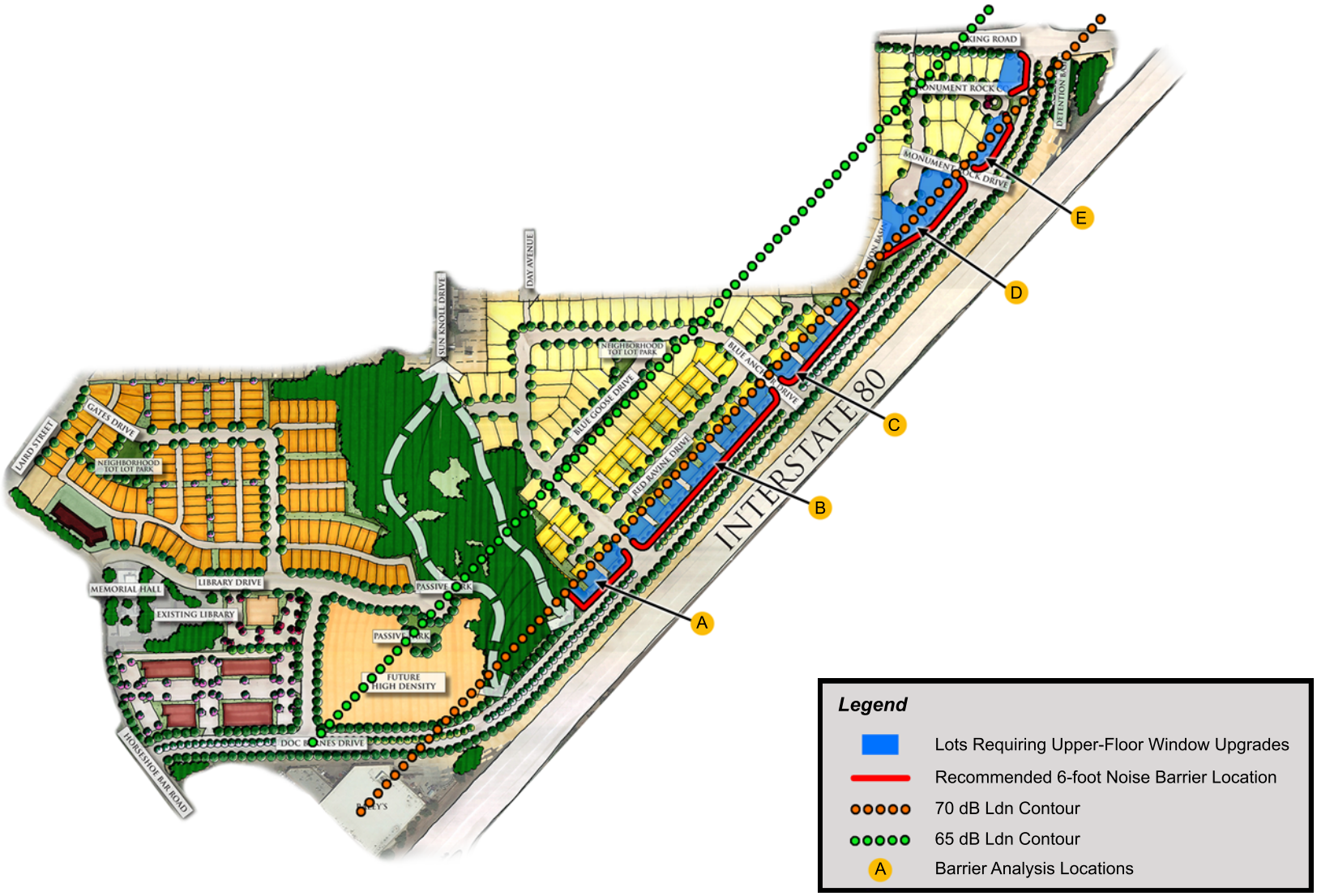
Scale (feet)
0 300 600

Figure 2

Project Site Plan and Recommended Noise Barrier Locations
Village at Loomis - Loomis, California



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Community Noise

Community noise is commonly described in terms of the “ambient” noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent, sound level (Leq), over a given time period (usually one hour). The Leq is the foundation of the day-night average noise descriptor, and shows very good correlation with community response to noise for the average person.

The Ldn is based upon the average noise level over a 24 hour day, with a +10 dB weighting applied to noise occurring during nighttime (10:00 p.m. to 7:00 a.m.) hours. The nighttime penalty is based upon the assumption that people react to nighttime noise exposures as though they were twice as loud as daytime exposures. Because Ldn represents a 24 hour average, it tends to disguise short-term variations in the noise environment. Where short-term noise sources are an issue, noise impacts may be assessed in terms of maximum noise levels, hourly averages, or other statistical descriptors.

Perception of Loudness

The perceived loudness of sounds and corresponding reactions to noise are dependent upon many factors, including sound pressure level, duration of intrusive sound, frequency of occurrence, time of occurrence, and frequency content. As mentioned above; however, within the usual range of environmental noise levels, perception of loudness is relatively predictable, and can be approximated by weighing the frequency response of a sound level meter by means of the standardized A-weighing network. Table 1 shows examples of noise levels for several common noise sources and environments.

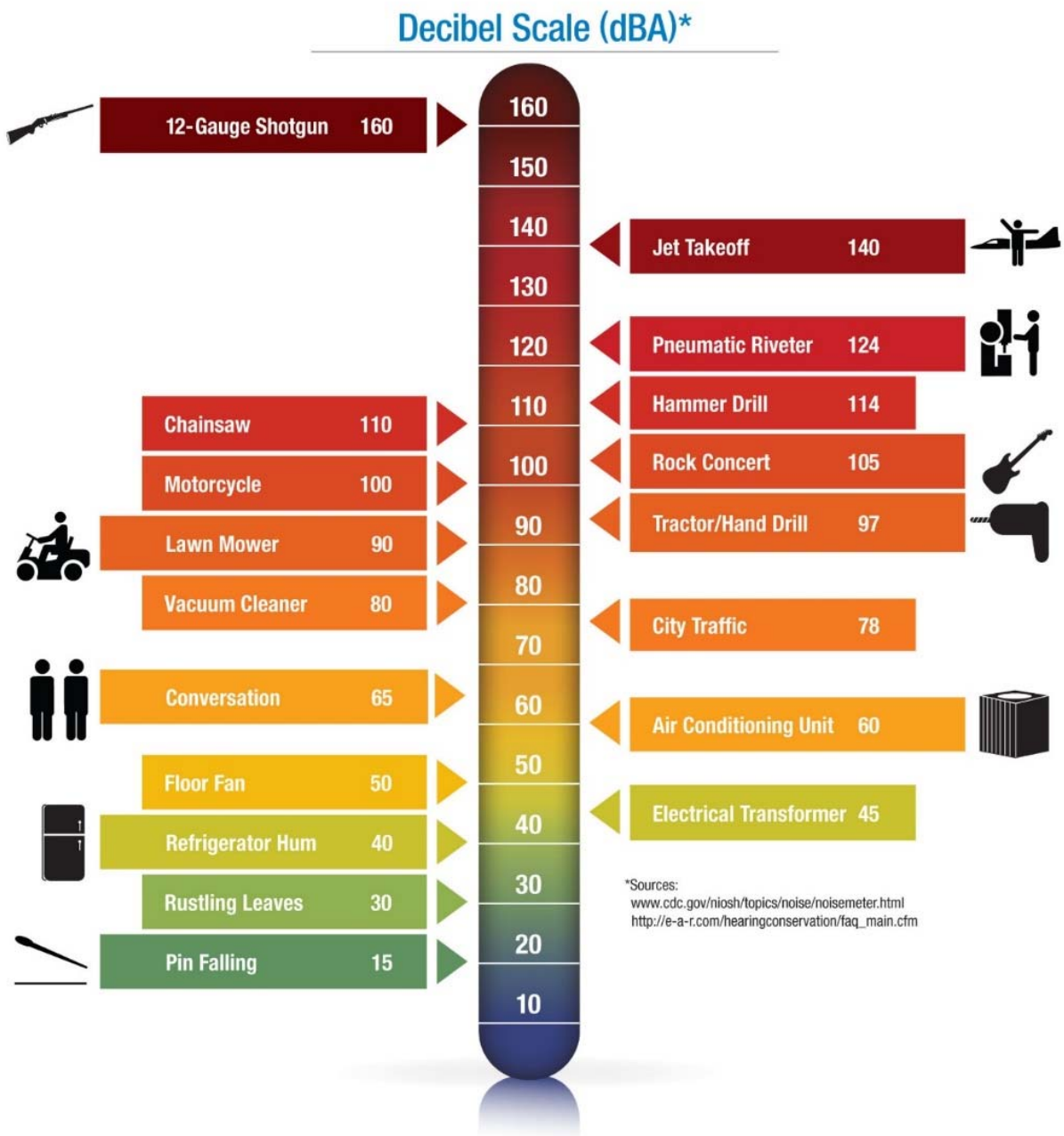
Sound Propagation

It is commonly understood that sound decreases with distance. But the propagation of sound is dependent on considerably more variables than distance alone. Those variables include the type of noise source (point, moving point, or line sources), the directionality of the noise source, the frequency content of the source (low frequency sound is absorbed in the atmosphere at a slower rate than high-frequency sound and therefore “carries” farther), atmospheric conditions (wind, temperature, humidity, gradients), ground type (dirt, grass fields, concrete, etc.), shielding (structures, noise barriers, topography), and vegetation.

For this project, proposed residential receptors are located within fairly close proximity to the major noise source (Interstate 80). At short distances between the source and receptor, the effects of the atmosphere on sound propagation are diminished, as those effects become more pronounced at distances in excess of 300 feet.

For the purposes of assessing noise sources within the project area, traffic on public roadways are considered “moving point” sources. The sound level decay rate for this type of source is 4.5 dB per doubling of distance from the source.

Table 1
Typical A-Weighted Sound Levels of Common Noise Sources



Criteria for Acceptable Noise Levels

Town of Loomis General Plan

The following goals and policies are presented in the Town's General Plan Noise Element and are applicable to the proposed project:

Goals

1. To protect Town residents and workers from the harmful and annoying effects of noise.
2. To mitigate the effects of noise created by roadway traffic and non-residential land uses while discouraging the construction of sound walls.
3. To maintain and where possible enhance the quiet, rural ambiance of the Town.
4. To minimize the noise effect of railroad operations on residential uses and other sensitive land uses.

Policies

1. New commercial and industrial development in the Town shall be sited and designed to minimize the potential for harmful or annoying noise to create conflict with existing land uses.
2. Loomis shall encourage the mitigation of noise impacts in all new developments as necessary to maintain the quiet, rural ambiance of the Town.
3. Individual noise exposure analysis shall be required for proposed development projects as part of the environmental review process, to ensure that the Town's noise standards are meet [sic]. The use of mitigation measures (noise buffers, sound insulation) may be required to reduce noise impacts to acceptable levels.
4. Loomis shall discourage the construction of sound walls to mitigate noise impacts, unless it is the only feasible alternative. New sensitive noise receptors shall not be permitted if the only feasible mitigation for noise impacts is a sound wall.
5. Where noise mitigation is necessary, the following order of preference among options shall be considered: distance from the noise source; muffling of the noise source; design and orientation of the receptor; landscaped berms; landscaped berms in combination with walls.
6. Use the land use/noise compatibility matrix shown on Figure 8-4 of the Town's General Plan to determine the appropriateness of land uses relative to roadway noise.
7. Provide for alternative transportation modes such as bicycle paths and pedestrian walkways to minimize the number of automobile trips.
8. Require that automobile and truck access to industrial and commercial properties adjacent to residential areas be located at the maximum practical distance from the residential area.

9. Limit the use of leaf blowers, motorized lawn mowers, parking lot sweepers, or other high-noise equipment on commercial properties if their activity will result in noise which adversely affects residential areas.
10. Require that the hours of truck deliveries to industrial and commercial properties adjacent to residential uses be limited to daytime hours unless there is no feasible alternative or there are overriding transportation benefits by scheduling deliveries at night.
11. Require that construction activities adjacent to residential units be limited as necessary to prevent adverse noise impacts (Town of Loomis 2001).

As shown in Table 2, the Noise Element establishes an exterior noise level standard of 65 dB L_{dn} for transportation noise sources, applied at outdoor activity areas (backyards) of residential land uses. The intent of this standard is to provide an acceptable exterior noise environment for outdoor activities. Additionally, the Town uses an interior noise level standard of 45 dB L_{dn} or less within noise-sensitive residential dwellings. The intent of this interior noise limit is to provide a suitable environment for indoor communication and sleep.

Table 2
Maximum Allowable Noise Exposure Levels (Ldn)

Noise Sensitive Land Use	Outdoor Activity Areas[1]	Interior Spaces	
	dBA L_{dn}	*dBA L_{dn}*	*dBA L_{eq}*
Residential	65	45	—
Transient lodging	65	45	—
Hospitals and nursing homes	65	45	—
Theaters, auditoriums, music halls	—	—	35
Churches, meeting halls	65	—	40
Office buildings	--	—	45
Schools, libraries, museums	—	—	45
Playgrounds, neighborhood parks	70	—	—

Source: Town of Loomis 2001, Table 8-3.
Notes:
1 Where the location of outdoor activity areas is unknown, the exterior noise level standard shall be applied to the property line of the receiving land use.
2 Where it is not possible to reduce noise in outdoor activity areas to 65 dB L_{dn}/CNEL or less using practical application of the best available noise reduction measures, an exterior noise level of up to 70 dB L_{dn}/CNEL may be allowed provided that available exterior noise level reduction measures have been implemented and interior noise levels are in compliance with this table.

The General Plan also includes standards for short duration noise events near residential areas that are otherwise normally quiet. These standards, shown in Table 3, apply to land uses within close proximity to land uses or other activities that can produce high noise levels of a shorter duration.

Table 3
Noise Standards for Short Duration Events near Residential Areas

Noise Sensitive Land Use	Duration of Sound (minutes per hour)	Standard	
		Day/Evening (7 am–10 pm) dBA	*Night (10 pm–7 am) dBA*
All Residential	30–60	50	40
	15–30	55	45
	5–15	60	50
	1–5	65	55
	<1 minute	70	60

Source: Town of Loomis 2001, Table 8-4.
Note:
[1] Where the offensive noise contains a steady, audible tone (such as a screech or hum), or is a repetitive noise such as hammering, or contains speech or music, the standard limits shown shall be reduced by 5 dB.

Significance of Project-Related Noise Level Increases

Table 4 is based upon recommendations made in August 1992 by Federal Interagency Committee on Noise (FICON) to provide guidance in the assessment of changes in ambient noise levels resulting from aircraft operations. The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by noise. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, these criteria have been applied to other sources of noise similarly described in terms of cumulative noise exposure metrics such as the L_{dn}.

Table 4
Significance of Changes in Cumulative Noise Exposure

Ambient Noise Level Without Project, L_{dn}	Increase Required for Significant Impact
<60 dB	+5.0 dB or more
60-65 dB	+3.0 dB or more
>65 dB	+1.5 dB or more

Source: Federal Interagency Committee on Noise (FICON)

According to Table 4, an increase in noise from similar sources of 5 dB or more would be noticeable where the ambient level is less than 60 dB. Where the ambient level is between 60 and 65 dB, an increase in noise of 3 dB or more would be noticeable, and an increase of 1.5 dB or more would be noticeable where the ambient noise level exceeds 65 dB L_{dn}. The rationale for the Table 4 criteria is that, as ambient noise levels increase, a smaller increase in noise resulting from a project is sufficient to cause annoyance.

Existing (Baseline) Noise Environment

Overview of Existing Noise Environment within the Project Area

The existing noise environment within the overall project area varies by location but is primarily defined by traffic noise. The most pervasive noise source affecting the project area is surface traffic on Interstate 80.

Existing General Ambient Noise Environment within the Project Area

To quantify the existing ambient noise environment at the project site, long-term (continuous) ambient noise level measurements were conducted at five locations within the proposed project area from December 30, 2014 to January 1, 2015. The locations of the continuous noise monitoring sites are shown in Figure 1, and the detailed results are shown numerically and graphically in Appendices B and C, respectively.

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the long-term ambient noise level measurement surveys. The meters were calibrated before use with LDL Model CAL200 acoustical calibrators to ensure the accuracy of the measurements. The equipment used meets all pertinent specifications of the American National Standards Institute.

The results of the long-term ambient noise measurement survey are summarized in Table 5. The Table 5 data indicate that existing noise levels within the project area vary depending on location of the noise monitoring site relative to Interstate 80. Inspection of the data showed that monitoring locations with the most direct view of I-80 recorded the highest noise levels during sampling.

Table 5
Measured Baseline Noise Levels at Long-Term Monitoring Sites
Village at Loomis Project Site

Site	Location	Distance to C/L	Measured L_{dn}
1	Along proposed extension of Doc Barnes Drive	210	64
2	Middle of site, same distance from I-80 as facades	230	63
3	Northern end of site	300	62
4	Southern end of site, near Raley's property line	310	62
5	Southern end of site, mostly unshielded from I-80	250	65

Source: Bollard Acoustical Consultants, Inc. (BAC)

The Table 5 data indicate that the noise monitoring locations on the project site were exposed to existing traffic noise levels at or below the Town's 65 dB L_{dn} exterior noise standard. This was observed to be due primarily to shielding by intervening topography. However, because future traffic noise levels would be greater than existing levels, a detailed analysis of existing and future traffic noise exposure at the project site was conducted.

Existing Traffic Noise Environment

Traffic Noise Prediction Methodology

The Federal Highway Administration Highway Traffic Noise Prediction Model (FHWA-RD-77-108) was used with the Calveno vehicle noise emission curves to predict existing traffic noise levels at the project site.

Traffic Noise Prediction Model Offsets

The FHWA Model provides reasonably accurate traffic noise predictions under “ideal” roadway conditions. Ideal conditions are generally considered to be long straight roadway segments with uniform vehicle speeds, a flat roadway surface, good pavement conditions, a statistically large volume of traffic, and an unimpeded view of the roadway from the receiver location. Such conditions are not present at this project site due to topographical shielding partially obscuring the roadway from view. As a result, Bollard Acoustical Consultants, Inc. utilized noise level data collected during the long-term monitoring conducted at the site with the FHWA Model to determine the amount of traffic noise reduction provided by topographic shielding.

The FHWA Model was used with existing traffic volumes for I-80 obtained from the Caltrans 2013 Average Daily Traffic (ADT) count data to determine unshielded traffic noise levels at each of the five long-term monitoring sites. These predicted levels were then compared with the average measured levels to determine the amount of noise reduction provided by topographic shielding at these locations. The detailed FHWA inputs and results are shown in Appendix D-1 and the resulting offsets are shown below in Table 6. Figure 3 provides a graphical representation of the difference between measured and modelled noise levels for Interstate 80.

Table 6
Noise Reduction Offsets due to Existing Topographic Shielding
Village at Loomis

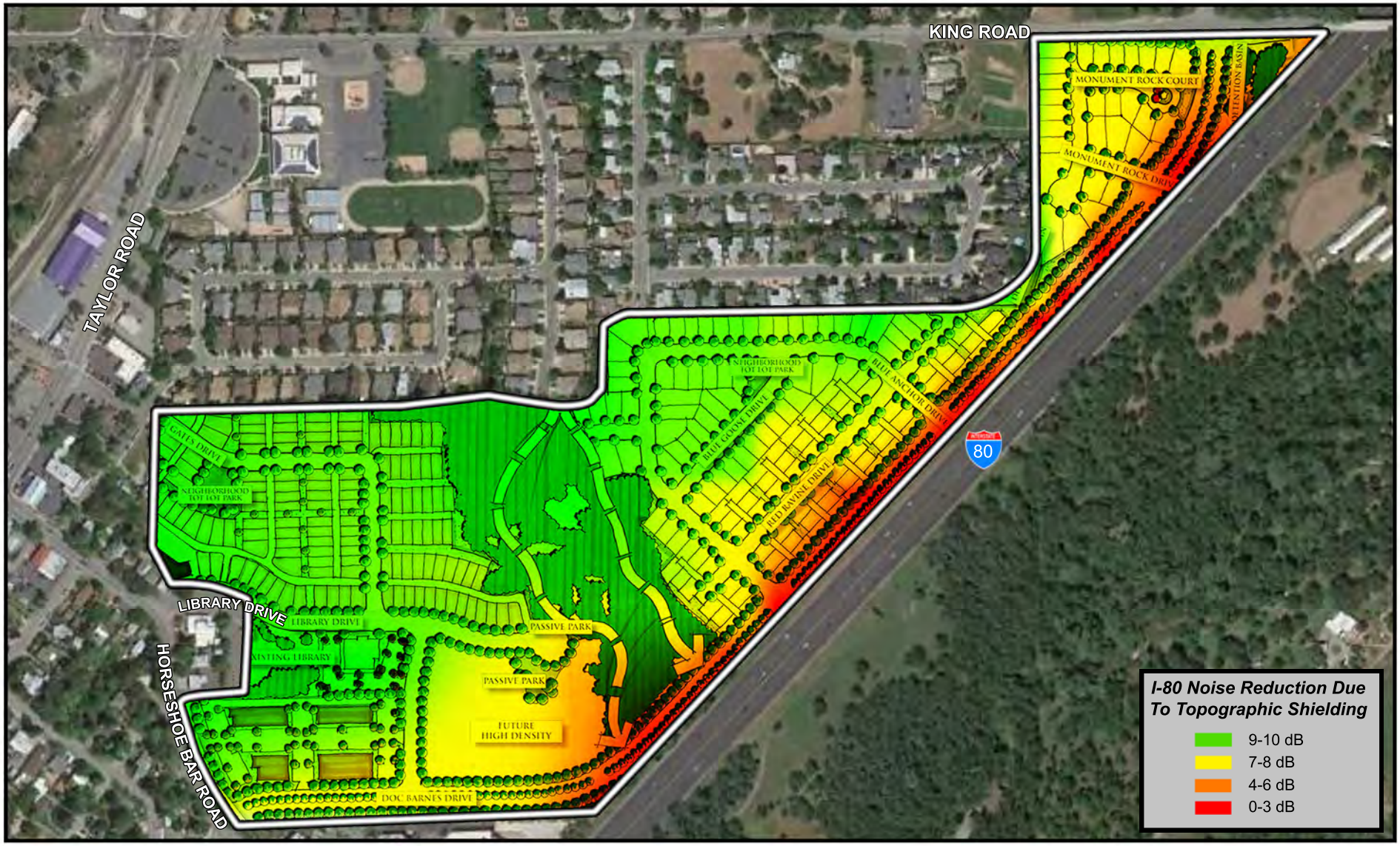
Site	Distance (ft)	Average Measured L_{dn}	FHWA Predicted L_{dn}	Offset (dB)
1	210	64	72	-8
2	230	63	72	-9
3	300	62	70	-8
4	310	62	70	-8
5	250	65	71	-6

Source: Bollard Acoustical Consultants, Inc. (BAC)

The Table 6 data indicate that significant topographic shielding of Interstate 80 traffic noise is present at the project site. Because site grading will result in the removal of some of this shielding in the future, a conservative offset of -4 dB was applied to the FHWA Model for predictions of future I-80 traffic noise at the proposed residences nearest to this roadway.

Figure 3

Topographic Shielding of I-80 Traffic Noise at the Project Site
Village at Loomis - Loomis, California



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Scale (feet)
0 300 600

Existing General Traffic Noise Environment in Project Vicinity

The FHWA Model was used with traffic data provided by the project transportation consultant, KD Anderson & Associates, to predict existing traffic noise levels in the project vicinity. Table 7 shows the predicted existing traffic noise levels at a reference distance of 100 feet from the roadway centerlines, as well as the distances to the unshielded L_{dn} contours. The FHWA Model Inputs for baseline conditions are provided in Appendix E.

Table 7
Existing (Baseline) Traffic Noise Levels and Distances to Traffic Noise Contours
Village at Loomis Development Roadways

			Distance to Ldn Contour (ft)		
Roadway	**Segment**	**L_{dn}[1]**	**70**	**65**	**60**
Taylor Rd	South of Horseshoe Bar Rd	58	16	34	74
Taylor Rd	Horseshoe Bar Rd – Webb St	61	24	51	110
Taylor Rd	Webb St – King Rd	60	21	46	99
King Rd	Taylor Rd – Boyington Rd	59	17	37	80
Horseshoe Bar Rd	Taylor Rd – Library Dr	59	20	42	91
Horseshoe Bar Rd	Library Drive – Doc Barnes Dr	62	29	64	137
Horseshoe Bar Rd	Doc Barnes Dr – Interstate 80	62	29	64	137
Horseshoe Bar Rd	Interstate 80 – Laird Rd	60	20	43	93
Day Ave	King Rd – David Ave	46	2	5	11
Laird St	Horseshoe Bar Rd – Webb St	48	4	8	17
Sun Knoll Dr	King Rd – Thornwood Dr	45	2	5	10
Boyington Rd	North of King Rd	55	9	20	44
Webb St	Taylor Rd – Laird St	46	3	6	12
Webb St	King Rd – Taylor Rd	54	8	17	37
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	--	--	--	--
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	--	--	--	--
Doc Barnes Dr	Blue Anchor Dr – King Rd	--	--	--	--
Library Dr	Horseshoe Bar Rd – Gates Dr	38	1	2	3
Interstate 80	Horseshoe Bar Rd to Penryn Rd	77	301	648	1397

1. L_{dn} is computed at a standardized distance of 100 feet from the roadway centerline.
Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

Impacts and Mitigation Measures

For this project, noise impacts both due to and upon the proposed Village at Loomis development are assessed. Noise impacts due to (resulting from) the proposed project would occur if project-generated traffic causes a substantial increase in traffic noise levels at existing noise-sensitive land uses in the immediate project vicinity.

Noise impacts upon the proposed project would result if projected future traffic noise exposure at the proposed residences within the Village at Loomis development site would exceed Town of Loomis noise standards at either the outdoor activity areas or interior spaces of individual residences.

The following sections separately evaluate noise impacts due to, and upon, the project development and the alternate roadway design (roundabout) alternative.

Off-Site Traffic Noise Impacts due to the Proposed Village at Loomis Development

Existing Vs. Existing Plus Project Traffic Noise Levels – Proposed Project

With development within the project area as a whole, traffic volumes on the local roadway network will increase. Those increases in daily traffic volumes will result in a corresponding increase in traffic noise levels. The FHWA Model was used with traffic data provided by the client to predict existing and existing plus project traffic noise levels, and the project-related noise level increases. The FHWA Model input data is contained in Appendix E. Table 8 shows existing versus existing plus project traffic noise levels on the regional roadway network.

Table 8
Existing Vs. Existing Plus Project Traffic Noise Levels
Village at Loomis Development Project

Roadway	Segment	Existing	Existing + Project	Change	Substantial Increase?
Taylor Rd	South of Horseshoe Bar Rd	58.1	58.5	0.4	No
Taylor Rd	Horseshoe Bar Rd – Webb St	60.6	60.4	-0.2	No
Taylor Rd	Webb St – King Rd	59.9	59.7	-0.2	No
King Rd	Taylor Rd – Boyington Rd	58.6	57.6	-0.9	No
Horseshoe Bar Rd	Taylor Rd – Library Dr	59.4	59.6	0.2	No
Horseshoe Bar Rd	Library Drive – Doc Barnes Dr	62.0	62.2	0.2	No
Horseshoe Bar Rd	Doc Barnes Dr – Interstate 80	62.0	62.9	0.8	No
Horseshoe Bar Rd	Interstate 80 – Laird Rd	59.5	59.7	0.1	No
Day Ave	King Rd – David Ave	45.5	45.5	0.0	No
Laird St	Horseshoe Bar Rd – Webb St	48.4	49.4	1.0	No
Sun Knoll Dr	King Rd – Thornwood Dr	45.0	45.0	0.1	No
Boyington Rd	North of King Rd	54.6	54.8	0.2	No
Webb St	Taylor Rd – Laird St	46.1	47.0	0.9	No
Webb St	King Rd – Taylor Rd	53.6	53.6	0.1	No
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	--	55.7	NA	NA
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	--	53.0	NA	NA
Doc Barnes Dr	Blue Anchor Dr – King Rd	--	52.3	NA	NA
Library Dr	Horseshoe Bar Rd to Gates Dr	37.8	49.0	11.2	Yes
Interstate 80	Horseshoe Bar Rd to Penryn Rd	77.2	77.2	0.0	No

Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

The Table 8 data indicate that the project would theoretically result in a substantial increase in traffic noise levels along Library Drive. However, Library Drive traffic is not the primary noise source at the nearest noise-sensitive receptor (an outdoor activity/picnic area near the existing library, approximately 100 feet from the centerline of Library Drive), due to a low existing traffic volume on the roadway. To more accurately quantify the existing ambient noise level in this area, BAC conducted a short-term (15-minute) noise level measurement at the site on August 18, 2015. Equipment used met the same specifications as described previously. The location of this measurement is shown in Figure 1, and the results are summarized below in Table 9.

Table 9
Short-Term Noise Measurement Results
Village at Loomis

Site	Location	Measured L_{eq} (dB)	Predicted L_{dn} (dB)[1]	Change With Project
A	Library outdoor activity area	47	53	Insignificant[2]

Notes:
1. Predicted L_{dn} estimated with conservative assumption that measured L_{eq} is constant
2. Existing L_{dn} plus project traffic L_{dn} less than 1 dB greater than existing L_{dn}

Source: Bollard Acoustical Consultants, Inc. (BAC)

As shown in Table 9, the existing measured ambient noise level at the picnic area is greater than the predicted Library Drive traffic noise level after project construction. Additionally, both the existing and existing plus project noise levels at this area are predicted to be well below the Town of Loomis exterior noise standard of 70 dB L_{dn} for neighborhood parks. As a result, the proposed project would not result in any significant off-site traffic noise impacts relative to existing baseline conditions.

Cumulative Vs. Cumulative Plus Project Traffic Noise Levels – Proposed Project

Using the same methodology described above, traffic noise levels were predicted for future (cumulative) and future plus project conditions. Table 10 shows the results of the cumulative traffic analysis.

Table 10
Cumulative Vs. Cumulative Plus Project Traffic Noise Levels
Village at Loomis Development Project

Roadway	Segment	Cumulative	Cumulative + Project	Change	Substantial Increase?
Taylor Rd	South of Horseshoe Bar Rd	59.1	59.2	0.1	No
Taylor Rd	Horseshoe Bar Rd – Webb St	61.6	61.5	-0.1	No
Taylor Rd	Webb St – King Rd	60.4	60.4	-0.1	No
King Rd	Taylor Rd – Boyington Rd	60.1	59.9	-0.2	No
Horseshoe Bar Rd	Taylor Rd – Library Dr	60.3	60.4	0.1	No
Horseshoe Bar Rd	Library Dr – Doc Barnes Dr	63.0	63.1	0.1	No
Horseshoe Bar Rd	Doc Barnes Dr – Interstate 80	62.9	63.7	0.8	No
Horseshoe Bar Rd	Interstate 80 – Laird Rd	61.3	61.1	-0.2	No
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	--	55.0	NA	NA
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	--	52.4	NA	NA
Doc Barnes Dr	Blue Anchor Dr – King Rd	--	51.6	NA	NA
Library Dr	Horseshoe Bar Rd – Gates Dr	37.8	49.3	11.5	Yes
Interstate 80	Horseshoe Bar Rd – Penryn Rd	78.6	78.6	0.0	No

Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

The Table 10 data indicate that the project would theoretically result in a substantial increase in traffic noise levels along Library Drive relative to cumulative conditions without the project. However, ambient noise levels at this location render project traffic noise insignificant, as described in the previous section. As a result, the proposed project would not result in any significant off-site traffic noise impacts relative to cumulative baseline conditions.

Off-Site Traffic Noise Impacts due to the Village at Loomis Development - Alternative Roadway Design (Roundabouts)

Figure 4 shows an alternative roadway design consisting roundabouts at the intersection of Horseshoe Bar Road and Library Drive, and Gates Drive and Webb Street. Potential traffic noise impacts associated with this alternative roadway design are evaluated below.

Existing Vs. Existing Plus Alternative Project Traffic Noise Levels

With development within the project area as a whole, traffic volumes on the local roadway network will increase. Those increases in daily traffic volumes will result in a corresponding increase in traffic noise levels. The FHWA Model was used with traffic data provided by the client to predict existing and existing plus alternative roadway design traffic noise levels, and the noise level increases resulting from the project with the alternative roadway design. The FHWA Model input data is contained in Appendix E. Table 11 shows existing versus alternative project traffic noise levels on the regional roadway network.

Table 11
Existing Vs. Existing Plus Alternative Project Traffic Noise Levels
Village at Loomis Development Project

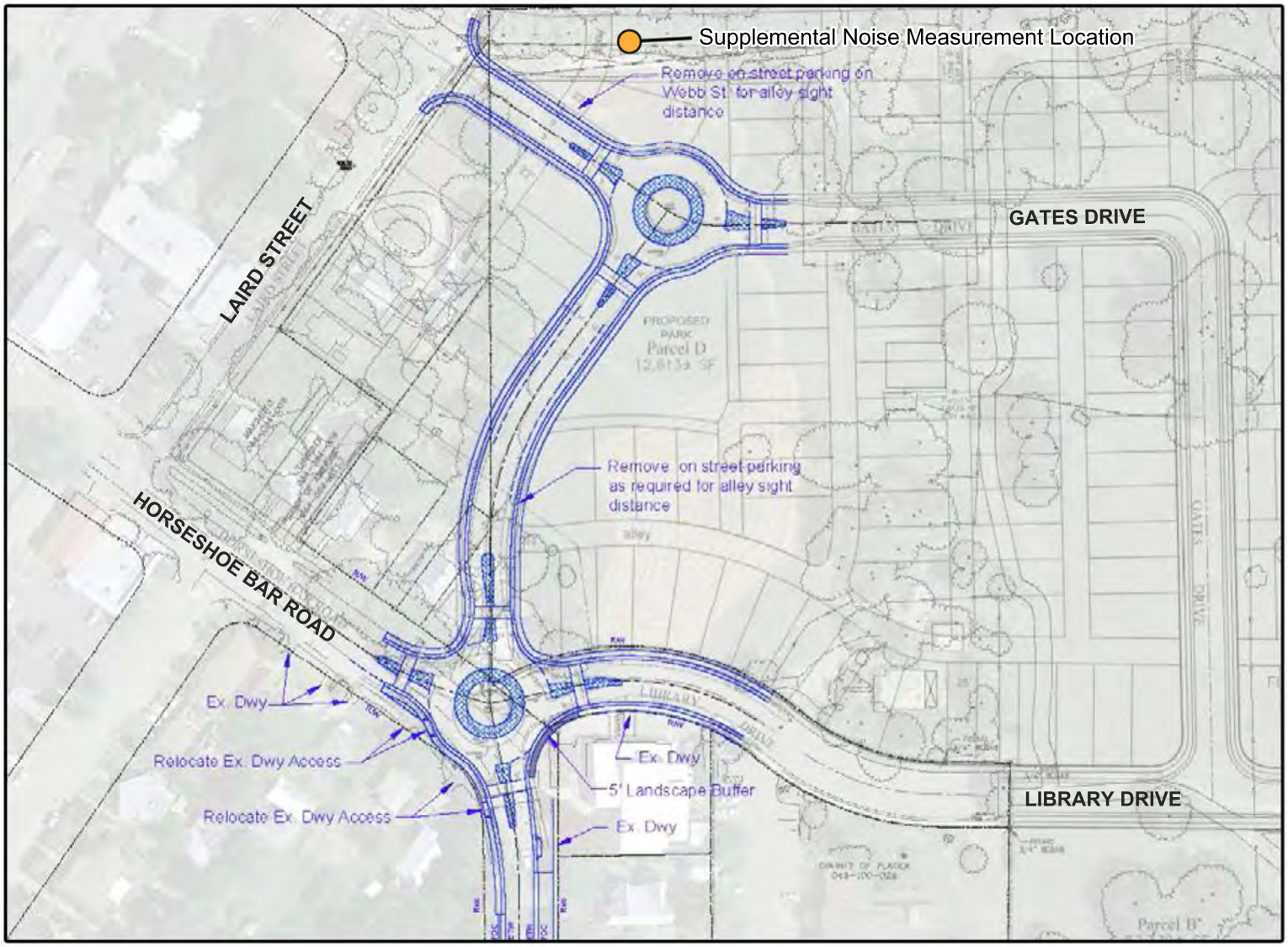
Roadway	Segment	Existing	Existing + Project Alt	Change	Substantial Increase?
Taylor Rd	South of Horseshoe Bar Rd	58.1	58.4	0.3	No
Taylor Rd	Horseshoe Bar Rd – Webb St	60.6	58.9	-1.7	No
Taylor Rd	Webb St – King Rd	59.9	59.7	-0.3	No
King Rd	Taylor Rd – Boyington Rd	58.6	57.9	-0.7	No
Horseshoe Bar Rd	Taylor Rd – Library Dr	59.4	57.7	-1.7	No
Horseshoe Bar Rd	Library Drive – Doc Barnes Dr	62.0	62.3	0.2	No
Horseshoe Bar Rd	Doc Barnes Dr – Interstate 80	62.0	62.4	0.0	No
Horseshoe Bar Rd	Interstate 80 – Laird Rd	59.5	59.9	0.3	No
Day Ave	King Rd – David Ave	45.5	45.5	0.0	No
Laird St	Horseshoe Bar Rd – Webb St	48.4	42.7	-5.7	No
Sun Knoll Dr	King Rd – Thornwood Dr	45.0	45.0	0.1	No
Boyington Rd	North of King Rd	54.6	54.8	0.2	No
Webb St	Taylor Rd – Laird St	46.1	54.4	8.3	Yes
Webb St	King Rd – Taylor Rd	53.6	53.7	0.1	No
Webb St	Laird St – Horseshoe Bar Rd	--	56.0	NA	NA
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	--	55.7	NA	NA
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	--	53.0	NA	NA
Doc Barnes Dr	Blue Anchor Dr – King Rd	--	52.3	NA	NA
Library Dr	Horseshoe Bar Rd to Gates Dr	37.8	48.1	10.3	Yes
Interstate 80	Horseshoe Bar Rd to Penryn Rd	77.2	77.2	0.0	No

Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

Figure 4

Alternative Roadway Design

Village at Loomis - Loomis, California



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Scale (feet)

0 80 160

The Table 11 data indicate that the project would theoretically result in a substantial increase in traffic noise levels along Library Drive. As described previously in this report, due to the contribution of noise from other local roadways to the noise environment at the Library picnic area, the proposed project would not result in any significant off-site traffic noise impacts relative to existing baseline conditions at this receptor. As a result, this impact is considered less than significant along library drive.

Table 11 also indicates that the project-related increase in traffic noise levels would be considered substantial along Webb Street between Taylor Road and Laird Street (8.3 dB increase). Land uses along this roadway segment include commercial businesses, Saint Marks Anglican Church, and the Koinonia Center. An outdoor picnic area is located within the Koinonia property and this area would be impacted by this roadway alternative. This is considered a significant noise impact. Because construction of a noise barrier cannot be mandated on the private Koinonia property, this impact would be considered significant and unavoidable.

In addition to the identified substantial increase in noise levels which would result from increased traffic on Webb Street between Taylor Road and Laird Street, traffic on the new roadway segment of Webb Street from Laird to the proposed roundabout at Horseshoe Bar Road may also result in substantial traffic noise increases at existing residences. To establish baseline conditions at a position generally representing the rear areas of existing residences on Laird Street, BAC conducted supplemental ambient noise monitoring at the location shown on Figure 4 in December 2015. The results of that analysis indicate that existing ambient conditions were 58 dB L_{dn} at the measurement site. Based on this measured level, the traffic noise levels predicted in Table 11 for the alternative extension of Webb Street between Laird Street and Horseshoe Bar Road (56 dB L_{dn}) would not be considered significant.

Cumulative Vs. Cumulative Plus Alternative Project Traffic Noise Levels

Using the same methodology described above, traffic noise levels were predicted for future (cumulative) and future plus project conditions with the alternative roadway design. Table 12 shows the results of the cumulative traffic analysis.

Table 12
Cumulative Vs. Cumulative Plus Project Alternative Traffic Noise Levels
Village at Loomis Development Project

Roadway	Segment	Cumulative	Cumulative + Project Alt	Change	Substantial Increase?
Taylor Rd	South of Horseshoe Bar Rd	59.1	59.1	0.0	No
Taylor Rd	Horseshoe Bar Rd – Webb St	61.6	59.6	-2.0	No
Taylor Rd	Webb St – King Rd	60.4	59.1	-1.4	No
King Rd	Taylor Rd – Boyington Rd	60.1	60.3	0.1	No
Horseshoe Bar Rd	Taylor Rd – Library Dr	60.3	57.9	-2.4	No
Horseshoe Bar Rd	Library Drive – Doc Barnes Dr	63.0	62.9	-0.1	No
Horseshoe Bar Rd	Doc Barnes Dr – Interstate 80	62.9	63.9	1.0	No
Horseshoe Bar Rd	Interstate 80 – Laird Rd	61.3	61.1	-0.2	No
Day Ave	King Rd – David Ave	45.5	45.5	0.0	No
Laird St	Horseshoe Bar Rd – Webb St	49.4	49.4	0.0	No
Sun Knoll Dr	King Rd – Thornwood Dr	45.0	45.0	0.0	No
Boyington Rd	North of King Rd	54.8	54.8	0.0	No
Webb St	Taylor Rd – Laird St	47.0	57.2	10.2	Yes
Webb St	King Rd – Taylor Rd	53.6	53.6	0.0	No
Webb St	Laird St – Horseshoe Bar Rd	--	57.1	NA	NA
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	--	55.0	NA	NA
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	--	52.4	NA	NA
Doc Barnes Dr	Blue Anchor Dr – King Rd	--	51.6	NA	NA
Library Dr	Horseshoe Bar Rd to Gates Dr	37.8	49.3	11.5	Yes
Interstate 80	Horseshoe Bar Rd to Penryn Rd	78.6	78.6	0.0	No

Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

The Table 12 data indicate that the project would theoretically result in a substantial increase in traffic noise levels along Library Drive relative to cumulative conditions without the project. However, ambient noise levels at this location render project traffic noise insignificant, as described in the previous section. However, the traffic noise increase at the outdoor activity area of the Koinonia Center on Webb Street would remain significant and unavoidable.

Noise Impacts upon the Village at Loomis Development

The primary noise source affecting proposed residences on the project site is Interstate 80. Proposed internal roadways, Doc Barnes Drive and Library Drive, which will be extended through the site as the primary site access roads, also contribute to the project area noise environment, but to a lesser extent. BAC utilized the FHWA Model to predict exterior traffic noise levels for internal project roadways. The results of that analysis are shown in Table 13.

Table 13
Cumulative Plus Project Traffic Noise Levels
Interior Roadways – Village at Loomis Development Project

Roadway	Segment	Ldn @ 100 ft	Distance to 60 dB Contour (ft)
Doc Barnes Dr	Horseshoe Bar Rd – Gates Dr	55	46
Doc Barnes Dr	Gates Dr – Blue Anchor Dr	52	31
Doc Barnes Dr	Blue Anchor Dr – King Rd	52	28
Library Dr	Horseshoe Bar Rd – Gates Dr	49	19

Source: FHWA-RD-77-108 with inputs prepared by KD Anderson & Associates

The Table 13 data, which represent predicted future (cumulative plus project) traffic noise levels within the project area, indicate that traffic noise levels from these internal roadways are predicted to be well within compliance with the Town of Loomis 65 dB L_{dn} exterior noise standard at future residences constructed adjacent to these roadways.

As noted previously, the most significant traffic noise source affecting the project site is Interstate 80. I-80 traffic noise is currently reduced at the project site due to topographic shielding by intervening topography. Inspection of proposed grading plans indicates that I-80 traffic noise will continue to be partially shielded by intervening topography. This shielding is conservatively estimated to be 4 dB.

Accounting for the estimated -4 dB offset provided by intervening topography following site grading, and using cumulative-plus-project Interstate 80 traffic volumes, the predicted noise level at the nearest residences is approximately 71 dB L_{dn}, which exceeds the Town's 65 dB L_{dn} exterior standard. As a result, BAC evaluated the effectiveness of solid noise barriers at several representative lots on the project site. The results of this analysis are shown below in Table 14, and detailed results are shown in Appendix F.

Table 14
Noise Barrier Analysis Results[1]
Interstate 80 - Village at Loomis

Barrier Analysis Location[2]	Barrier Height (feet)	Noise Level, L_{dn} (dB)[3]
A	6	65
	7	64
	8	62
B	6	65
	7	64
	8	62
C	6	65
	7	64
	8	63
D	6	65
	7	64
	8	62
E	6	65
	7	64
	8	63

Notes:
1. Complete listings of noise barrier effectiveness inputs and results are provided in Appendix F.
2. Representative noise barrier analysis locations are shown on Figure 2.
3. Resulting noise level at primary outdoor activity area (Backyards)

Source: Bollard Acoustical Consultants, Inc. (2015)

The Table 14 data indicate that a barrier height of 6 feet would be required to reduce Interstate 80 noise levels to 65 dB L_{dn} at all nearest proposed outdoor activity areas. Figure 2 shows the recommended location of the noise barrier.

As noted in the Criteria section of this report, the Town of Loomis discourages the construction of sound walls to mitigate noise impacts, unless it is the only feasible alternative. In addition, where noise mitigation is necessary, the Town's noise policy states that the following order of preference among options shall be considered: distance from the noise source; muffling of the noise source; design and orientation of the receptor; landscaped berms; landscaped berms in combination with walls.

The design of this project is such that noise mitigation measures have been incorporated in the project plans. Specifically, setbacks from I-80 have been built into the project design by locating Doc Barnes Drive adjacent to the I-80 right of way, with the nearest proposed residences located further north. The project grading plans also incorporate a degree of topographic shielding to provide additional reduction of I-80 traffic noise levels at the project site. The use of 6-tall noise barriers would provide the final degree of noise reduction required to achieve satisfaction with the Town's noise standards.

Interior Areas of Proposed Residences

After construction of the required barrier, the exterior noise environment within this development is predicted to be approximately 65 dB L_{dn} or less at first-floor facades. To achieve compliance with the Town's 45 dB L_{dn} interior noise standard within first-floor rooms, a building facade noise reduction of 20 dB would be required of first-floor exterior wall construction.

Standard residential construction (stucco siding, STC-27 windows, door weather-stripping, exterior wall insulation, composition plywood roof) typically results in an exterior to interior noise reduction of about 25 dB with windows closed, and approximately 15 dB with windows open. Therefore, standard construction practices would be adequate for first-floor facades of all residences constructed within this development, provided mechanical equipment is included in the project construction to allow occupants to close doors and windows as desired for additional acoustical isolation.

Due to reduced ground absorption and topographic shielding at elevated positions, second-floor traffic noise levels are predicted to be approximately 4 dB higher than first-floor levels. In addition, second-floor facades would not be shielded by the recommended noise barriers. As a result, second floor exposure of the residences proposed adjacent to Interstate 80 would be approximately 75 dB L_{dn}. As a result, a building facade noise reduction of 30 dB would be required to meet the Town standard. To ensure satisfaction of the Town's 45 dB L_{dn} interior noise level standard, this analysis recommends that all second-floor bedroom windows of the lots adjacent to Doc Barnes Drive from which Interstate 80 is visible have a minimum Sound Transmission Class (STC) rating of 32. The lots requiring window upgrades are shown in Figure 2.

Noise Impacts at Future High-Density Residential Uses

As indicated in Figure 2, high density residential uses are proposed in the southwestern portion of the project site. Because specific site development plans have not been completed for this component of the project, it is not feasible to evaluate potential noise impacts at exterior or interior spaces of that future development. However, due to I-80 traffic noise exposure and noise generated by periodic truck deliveries to the Raley's store, it is possible that noise impacts could occur at this future high-density residential component of the Villages at Loomis development. Once site development plans have been submitted for the high-density development component of this project, those plans should be reviewed by an acoustical consultant to ensure that adequate shielding of outdoor activity areas and adequate interior sound isolation has been incorporated into the project design and construction details.

Construction Noise Impacts

During project construction, heavy equipment would be used for demolition, grading excavation, paving, and building construction, which would increase ambient noise levels when in use. Noise levels would vary depending on the type of equipment used, how it is operated, and how well it is maintained. Noise exposure at any single point outside the project site would also vary depending on the proximity of construction activities to that point. Standard construction equipment, such as graders, backhoes, loaders, and trucks, would be used for this work.

The range of maximum noise levels for various types of construction equipment at a distance of 50 feet is depicted in Table 15. The noise values represent maximum noise generation, or full-power operation of the equipment. As one increases the distance between equipment, or increases separation of areas with simultaneous construction activity, dispersion and distance attenuation reduce the effects of combining separate noise sources.

Table 15
Construction Equipment Noise Emission Levels

Equipment	Typical Sound Level (dBA) 50 Feet from Source
Air compressor	81
Backhoe	80
Compactor	82
Concrete mixer	85
Concrete pump	82
Concrete vibrator	76
Crane, mobile	83
Dozer	85
Generator	81
Grader	85
Impact wrench	85
Jackhammer	88
Loader	85
Paver	89
Pneumatic tool	85
Pump	76
Roller	74
Saw	76
Truck	88

Source: FTA 2006.

The nearest sensitive receptors to the proposed project are the residences located adjacent to the western and northern boundaries of the project site. The nearest residences are located directly adjacent to the project site. Other residences are located further to the west and north. Construction of the proposed project would expose these sensitive receptors to increased ambient exterior noise levels. As shown in Table 15, outdoor noise levels at noise-sensitive receptors 50 feet from the noise source could reach as high as 89 dBA. The noise levels from construction operations decrease at a rate of approximately 6 dB per doubling of distance from the source. In addition, a typical building can reduce noise levels by 25 dBA with the windows closed, which would reduce the maximum noise level to 64 dBA.

Noise generated by project construction could exceed the Town's standards for short duration events near residential areas, as listed in Table 15. Therefore, noise mitigation measures should be incorporated to minimize the potential for adverse public reaction to project construction noise. Because construction would be short-term in duration near any given existing noise-sensitive receptor, significant noise impacts are not anticipated provided the following measures are implemented.

- Project construction activities should be limited to daytime hours unless conditions warrant that certain construction activities occur during evening or early morning hours (i.e. extreme heat).
- All noise-producing project equipment and vehicles using internal-combustion engines shall be equipped with mufflers, air-inlet silencers where appropriate, and any other shrouds, shields, or other noise-reducing features in good operating condition that meet or exceed original factory specifications. Mobile or fixed "package" equipment (e.g., arc welders, air compressors) shall be equipped with shrouds and noise-control features that are readily available for that type of equipment.
- All mobile or fixed noise-producing equipment used on the project site that are regulated for noise output by a federal, state, or local agency shall comply with such regulations while in the course of project activity.
- Electrically powered equipment shall be used instead of pneumatic or internal-combustion-powered equipment, where feasible.
- Material stockpiles and mobile equipment staging, parking, and maintenance areas shall be located as far as practicable from noise-sensitive receptors.
- Construction site and access road speed limits shall be established and enforced during the construction period.
- The use of noise-producing signals, including horns, whistles, alarms, and bells, shall be for safety warning purposes only.
- No project-related public address or music system shall be audible at any adjacent receptor.

Conclusions and Recommendations

Traffic generated by the proposed Village at Loomis Development is not predicted to result in adverse noise impacts along offsite roadways. As a result, no offsite noise impacts or mitigation measures are identified for this project.

Although no adverse off-site traffic noise impacts are identified for this project, future unmitigated Interstate 80 traffic noise levels are predicted to exceed the exterior and interior noise level standards of the Town of Loomis at the residences proposed within this development. As a result, the following specific recommendations are made to achieve satisfaction with those standards:

1. Upper-floor windows of residences constructed closest to I-80 (shown in Figure 2) should meet a minimum Sound Transmission Class rating of 32.

2. Air conditioning should be provided for all residences constructed within this development to allow occupants to close doors and windows as desired for additional acoustical isolation.

3. A solid noise barrier of 6 feet in height relative to pad elevations should be constructed at the locations identified in Figure 2.

4. When specific site development plans have been developed for the proposed high-density residential component of this development, those plans should be reviewed by an acoustical consultant to ensure that adequate shielding of outdoor activity areas and adequate interior sound isolation has been incorporated into the project design and construction details to ensure compliance with Town of Loomis 45 dB L_{dn} interior and 65 dB L_{dn} exterior noise standards.

These conclusions are based on the traffic noise level data collected by Bollard Acoustical Consultants, Inc. and the assumptions cited herein. Substantial variations in traffic volumes on the roadways located adjacent to the project site could yield noise levels different than those presented in this report. Bollard Acoustical Consultants, Inc. is not responsible for degradation of acoustic performance due to poor construction practices or failure to adhere to Uniform Building Code requirements.

This concludes our environmental noise assessment for the Village at Loomis Development Project in Loomis, California. Please contact Paul Bollard at (916) 663-0500 or paulb@bacnoise.com with any questions or require additional information.

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
Ldn	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
Leq	Equivalent or energy-averaged sound level.
Lmax	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT_{60}	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.

Appendix B-1

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Tuesday, December 30, 2014

Hour	Leq	Lmax	L50	L90
0:00	55	67	53	47
1:00	54	66	50	44
2:00	55	71	51	45
3:00	58	83	52	44
4:00	59	82	55	47
5:00	58	70	56	50
6:00	60	69	60	55
7:00	62	73	61	58
8:00	61	72	61	57
9:00	61	70	60	57
10:00	60	70	60	57
11:00	61	76	60	57
12:00	62	70	61	59
13:00	62	71	61	59
14:00	62	73	62	60
15:00	63	72	62	60
16:00	62	74	62	60
17:00	62	67	61	59
18:00	61	82	60	57
19:00	59	67	58	55
20:00	58	72	57	53
21:00	58	77	57	52
22:00	57	69	55	49
23:00	56	75	53	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63	58	61	60	54	57
Lmax (Maximum)	82	67	72	83	66	72
L50 (Median)	62	57	60	60	50	54
L90 (Background)	60	52	57	55	44	47

Computed Ldn, dB	64
% Daytime Energy	80%
% Nighttime Energy	20%

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Appendix B-2

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Wednesday, December 31, 2014

Hour	Leq	Lmax	L50	L90
0:00	54	69	51	44
1:00	54	76	48	40
2:00	54	66	48	38
3:00	54	69	50	41
4:00	56	69	54	44
5:00	59	69	57	51
6:00	60	70	59	55
7:00	62	75	61	58
8:00	61	70	61	57
9:00	61	72	60	56
10:00	61	71	61	57
11:00	61	77	61	58
12:00	61	71	61	58
13:00	62	76	61	58
14:00	61	72	61	58
15:00	61	74	61	58
16:00	62	73	61	58
17:00	62	78	62	59
18:00	62	74	61	59
19:00	62	72	61	58
20:00	59	72	58	54
21:00	58	73	57	53
22:00	57	72	55	50
23:00	56	71	55	50

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	58	61	60	54	57
Lmax (Maximum)	78	70	73	76	66	70
L50 (Median)	62	57	60	59	48	53
L90 (Background)	59	53	57	55	38	46

Computed Ldn, dB	64
% Daytime Energy	83%
% Nighttime Energy	17%

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Appendix B-3

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Thursday, January 01, 2015

Hour	Leq	Lmax	L50	L90
0:00	57	79	55	50
1:00	55	70	54	49
2:00	53	65	51	46
3:00	52	66	49	43
4:00	53	69	49	43
5:00	54	67	51	45
6:00	57	71	55	50
7:00	58	72	57	53
8:00	58	67	57	53
9:00	58	68	57	53
10:00	60	73	59	56
11:00	61	72	60	58
12:00	61	70	60	58
13:00	61	75	61	58
14:00	62	76	61	58
15:00	62	73	61	59
16:00	63	79	62	59
17:00	63	79	62	59
18:00	62	70	61	58
19:00	60	75	59	56
20:00	60	72	59	55
21:00	59	78	58	54
22:00	57	67	56	52
23:00	56	71	55	49

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63	58	61	57	52	55
Lmax (Maximum)	79	67	73	79	65	69
L50 (Median)	62	57	60	56	49	53
L90 (Background)	59	53	57	52	43	48

Computed Ldn, dB	63
% Daytime Energy	86%
% Nighttime Energy	14%

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Appendix B-4

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Tuesday, December 30, 2014

Hour	Leq	Lmax	L50	L90
0:00	55	68	52	47
1:00	53	68	50	44
2:00	55	71	52	44
3:00	58	77	52	44
4:00	59	84	54	47
5:00	57	71	55	48
6:00	59	69	58	54
7:00	61	76	60	57
8:00	60	72	59	56
9:00	59	68	58	56
10:00	58	68	58	55
11:00	60	68	59	56
12:00	61	72	61	58
13:00	61	69	61	59
14:00	62	70	61	59
15:00	62	69	61	59
16:00	61	69	61	58
17:00	60	67	60	57
18:00	58	67	58	55
19:00	57	67	56	53
20:00	57	72	56	52
21:00	56	73	54	50
22:00	55	65	53	49
23:00	53	70	51	44

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	56	60	59	53	56
Lmax (Maximum)	76	67	70	84	65	72
L50 (Median)	61	54	59	58	50	53
L90 (Background)	59	50	56	54	44	47

Computed Ldn, dB	64
% Daytime Energy	78%
% Nighttime Energy	22%

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Appendix B-5

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Wednesday, December 31, 2014

Hour	Leq	Lmax	L50	L90
0:00	53	66	49	43
1:00	52	75	46	38
2:00	52	67	47	37
3:00	52	67	48	39
4:00	54	69	52	43
5:00	57	68	55	49
6:00	58	72	57	54
7:00	60	72	59	56
8:00	59	69	58	55
9:00	58	71	57	54
10:00	58	67	57	54
11:00	58	75	58	55
12:00	58	70	57	54
13:00	58	73	57	55
14:00	58	67	57	55
15:00	58	66	58	55
16:00	59	71	58	56
17:00	61	81	59	57
18:00	60	69	59	57
19:00	60	70	59	56
20:00	57	67	56	52
21:00	57	71	56	52
22:00	55	68	54	49
23:00	55	69	53	50

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	57	59	58	52	55
Lmax (Maximum)	81	66	71	75	66	69
L50 (Median)	59	56	58	57	46	51
L90 (Background)	57	52	55	54	37	45

Computed Ldn, dB	62
% Daytime Energy	81%
% Nighttime Energy	19%

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Appendix B-6

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Thursday, January 01, 2015

Hour	Leq	Lmax	L50	L90
0:00	57	83	54	50
1:00	54	67	53	49
2:00	53	68	51	46
3:00	52	66	48	42
4:00	52	70	48	42
5:00	53	65	51	45
6:00	56	69	54	50
7:00	57	69	56	52
8:00	57	67	56	52
9:00	57	67	56	52
10:00	57	69	57	54
11:00	58	70	58	55
12:00	58	75	57	55
13:00	58	72	58	55
14:00	58	74	58	55
15:00	59	70	59	56
16:00	60	74	59	57
17:00	61	75	60	58
18:00	60	70	60	57
19:00	59	73	58	55
20:00	59	71	58	54
21:00	58	75	57	53
22:00	57	70	56	51
23:00	56	69	54	49

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	57	59	57	52	55
Lmax (Maximum)	75	67	71	83	65	70
L50 (Median)	60	56	58	56	48	52
L90 (Background)	58	52	55	51	42	47

Computed Ldn, dB	62
% Daytime Energy	81%
% Nighttime Energy	19%

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Appendix B-7

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Tuesday, December 30, 2014

Hour	Leq	Lmax	L50	L90
0:00	54	65	52	46
1:00	52	65	49	43
2:00	53	65	50	43
3:00	56	75	51	43
4:00	56	67	54	47
5:00	56	67	55	49
6:00	59	66	58	55
7:00	60	70	60	57
8:00	60	70	59	57
9:00	60	69	59	57
10:00	59	69	59	56
11:00	60	68	59	57
12:00	61	68	61	59
13:00	61	69	61	59
14:00	62	71	61	60
15:00	62	69	61	60
16:00	61	67	61	59
17:00	61	66	60	58
18:00	59	65	59	56
19:00	58	68	57	54
20:00	57	68	56	53
21:00	56	67	55	51
22:00	55	63	54	48
23:00	54	68	51	44

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	56	60	59	52	55
Lmax (Maximum)	71	65	68	75	63	67
L50 (Median)	61	55	59	58	49	53
L90 (Background)	60	51	57	55	43	46

Computed Ldn, dB	63
% Daytime Energy	83%
% Nighttime Energy	17%

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Appendix B-8

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Wednesday, December 31, 2014

Hour	Leq	Lmax	L50	L90
0:00	53	64	50	43
1:00	52	70	47	38
2:00	52	64	48	37
3:00	52	62	49	39
4:00	55	66	52	44
5:00	57	70	56	50
6:00	58	68	58	54
7:00	60	70	59	56
8:00	59	67	59	56
9:00	58	68	58	55
10:00	59	67	58	56
11:00	59	68	59	56
12:00	59	67	59	56
13:00	59	67	59	56
14:00	59	64	59	57
15:00	59	69	59	57
16:00	60	70	60	57
17:00	62	81	61	58
18:00	60	70	60	57
19:00	60	67	59	56
20:00	57	66	56	52
21:00	56	73	55	51
22:00	55	65	54	49
23:00	55	69	53	48

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	56	59	58	52	55
Lmax (Maximum)	81	64	69	70	62	66
L50 (Median)	61	55	59	58	47	52
L90 (Background)	58	51	56	54	37	45

Computed Ldn, dB	62
% Daytime Energy	82%
% Nighttime Energy	18%

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Appendix B-9

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Thursday, January 01, 2015

Hour	Leq	Lmax	L50	L90
0:00	56	80	54	49
1:00	54	64	53	48
2:00	52	63	50	44
3:00	51	63	48	39
4:00	52	67	48	41
5:00	53	65	51	44
6:00	55	65	54	49
7:00	56	66	56	52
8:00	56	64	56	52
9:00	56	65	55	52
10:00	57	67	56	54
11:00	58	67	58	55
12:00	59	68	58	56
13:00	59	69	59	56
14:00	59	65	59	56
15:00	60	72	59	57
16:00	61	72	60	58
17:00	62	70	61	59
18:00	61	70	61	58
19:00	59	69	58	56
20:00	59	68	58	54
21:00	58	67	57	53
22:00	56	64	55	51
23:00	55	66	53	48

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	62	56	59	56	51	54
Lmax (Maximum)	72	64	68	80	63	66
L50 (Median)	61	55	58	55	48	52
L90 (Background)	59	52	55	51	39	46

Computed Ldn, dB	62
% Daytime Energy	83%
% Nighttime Energy	17%

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Appendix B-10

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Tuesday, December 30, 2014

Hour	Leq	Lmax	L50	L90
0:00	53	64	51	45
1:00	53	67	50	44
2:00	51	67	48	42
3:00	53	67	48	39
4:00	55	74	53	46
5:00	55	71	53	45
6:00	58	73	56	51
7:00	59	72	59	57
8:00	59	67	59	56
9:00	57	67	57	54
10:00	56	70	56	53
11:00	58	71	57	53
12:00	60	79	60	57
13:00	61	72	60	58
14:00	61	72	61	58
15:00	61	71	61	59
16:00	61	69	61	58
17:00	60	71	60	57
18:00	58	66	57	54
19:00	56	64	55	52
20:00	55	66	54	51
21:00	54	64	53	50
22:00	56	80	53	48
23:00	52	64	50	45

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	61	54	59	58	51	54
Lmax (Maximum)	79	64	69	80	64	70
L50 (Median)	61	53	58	56	48	51
L90 (Background)	59	50	55	51	39	45

Computed Ldn, dB	62
% Daytime Energy	83%
% Nighttime Energy	17%

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Appendix B-11

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Wednesday, December 31, 2014

Hour	Leq	Lmax	L50	L90
0:00	52	62	49	42
1:00	52	67	48	41
2:00	51	68	46	37
3:00	49	62	45	38
4:00	52	63	49	41
5:00	55	70	53	46
6:00	56	72	55	51
7:00	58	71	57	53
8:00	59	77	58	54
9:00	56	71	55	52
10:00	55	66	55	51
11:00	58	77	56	53
12:00	57	76	55	53
13:00	57	75	55	53
14:00	58	75	55	53
15:00	56	67	55	52
16:00	56	68	56	53
17:00	58	74	58	55
18:00	59	74	58	55
19:00	59	67	58	56
20:00	58	74	56	51
21:00	56	69	55	50
22:00	54	66	53	47
23:00	54	67	52	47

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	59	55	57	56	49	53
Lmax (Maximum)	77	66	72	72	62	66
L50 (Median)	58	55	56	55	45	50
L90 (Background)	56	50	53	51	37	43

Computed Ldn, dB	61
% Daytime Energy	81%
% Nighttime Energy	19%

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Appendix B-12

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Thursday, January 01, 2015

Hour	Leq	Lmax	L50	L90
0:00	54	71	52	46
1:00	54	63	53	48
2:00	52	63	51	45
3:00	51	64	48	40
4:00	51	66	48	40
5:00	51	67	48	40
6:00	58	79	53	47
7:00	55	66	54	49
8:00	57	71	56	52
9:00	55	66	54	51
10:00	55	64	54	50
11:00	56	64	55	52
12:00	56	67	55	52
13:00	56	67	55	52
14:00	56	69	56	53
15:00	57	71	56	53
16:00	57	72	57	54
17:00	60	71	59	56
18:00	60	73	59	57
19:00	59	78	58	55
20:00	57	67	57	53
21:00	58	79	56	53
22:00	58	75	56	52
23:00	56	70	54	49

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	60	55	57	58	51	55
Lmax (Maximum)	79	64	70	79	63	69
L50 (Median)	59	54	56	56	48	51
L90 (Background)	57	49	53	52	40	45

Computed Ldn, dB	62
% Daytime Energy	75%
% Nighttime Energy	25%

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Appendix B-13

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Tuesday, December 30, 2014

Hour	Leq	Lmax	L50	L90
0:00	56	68	53	47
1:00	54	68	50	43
2:00	55	69	51	44
3:00	58	76	54	45
4:00	59	77	55	47
5:00	59	72	58	51
6:00	61	70	60	56
7:00	62	73	62	58
8:00	62	72	61	58
9:00	61	69	61	57
10:00	61	72	61	57
11:00	62	79	62	59
12:00	63	71	63	60
13:00	63	71	63	61
14:00	63	74	63	61
15:00	64	72	63	61
16:00	63	72	63	60
17:00	63	70	62	60
18:00	61	75	60	57
19:00	60	69	59	55
20:00	59	72	58	54
21:00	59	76	57	52
22:00	57	68	56	50
23:00	56	72	53	46

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	59	62	61	54	58
Lmax (Maximum)	79	69	73	77	68	71
L50 (Median)	63	57	61	60	50	54
L90 (Background)	61	52	58	56	43	48

Computed Ldn, dB	65
% Daytime Energy	82%
% Nighttime Energy	18%

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Appendix B-14

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Wednesday, December 31, 2014

Hour	Leq	Lmax	L50	L90
0:00	56	67	52	45
1:00	55	74	49	41
2:00	54	67	48	39
3:00	54	66	50	41
4:00	57	71	54	45
5:00	60	71	58	52
6:00	61	72	60	56
7:00	62	72	61	58
8:00	62	74	61	57
9:00	62	72	61	57
10:00	62	70	61	58
11:00	62	76	62	59
12:00	61	71	61	58
13:00	62	76	61	59
14:00	62	68	61	58
15:00	62	76	61	58
16:00	62	71	61	58
17:00	63	80	62	59
18:00	62	71	62	59
19:00	62	74	61	58
20:00	59	71	58	54
21:00	59	72	57	53
22:00	58	69	56	50
23:00	57	71	55	50

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	63	59	62	61	54	57
Lmax (Maximum)	80	68	73	74	66	70
L50 (Median)	62	57	61	60	48	54
L90 (Background)	59	53	57	56	39	46

Computed Ldn, dB	65
% Daytime Energy	82%
% Nighttime Energy	18%

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Appendix B-15

2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Thursday, January 01, 2015

Hour	Leq	Lmax	L50	L90
0:00	57	75	56	50
1:00	56	70	54	49
2:00	55	67	52	45
3:00	53	66	49	41
4:00	54	71	49	42
5:00	57	78	53	45
6:00	58	70	56	50
7:00	59	70	57	53
8:00	59	70	58	54
9:00	59	70	58	54
10:00	60	70	60	56
11:00	62	74	61	58
12:00	62	73	61	58
13:00	62	75	61	58
14:00	62	76	61	58
15:00	62	79	62	59
16:00	63	79	62	59
17:00	64	80	64	61
18:00	63	75	62	59
19:00	62	74	61	57
20:00	61	70	59	55
21:00	60	78	58	54
22:00	58	69	57	52
23:00	57	71	55	49

	Statistical Summary					
	Daytime (7 a.m. - 10 p.m.)			Nighttime (10 p.m. - 7 a.m.)		
	High	Low	Average	High	Low	Average
Leq (Average)	64	59	62	58	53	56
Lmax (Maximum)	80	70	74	78	66	71
L50 (Median)	64	57	60	57	49	53
L90 (Background)	61	53	57	52	41	47

Computed Ldn, dB	64
% Daytime Energy	85%
% Nighttime Energy	15%

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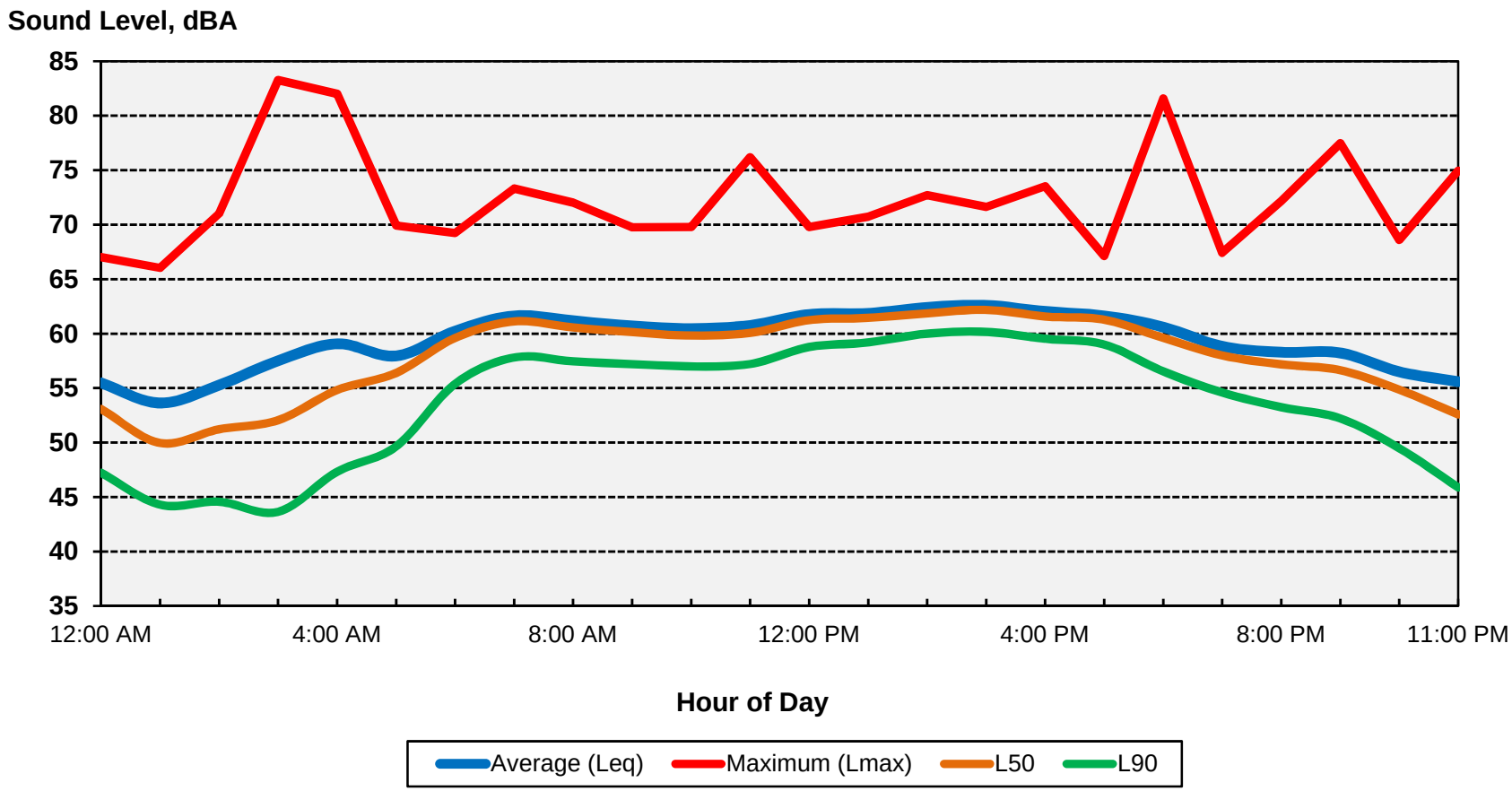
Appendix C-1
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Tuesday, December 30, 2014



Ldn: 64 dB

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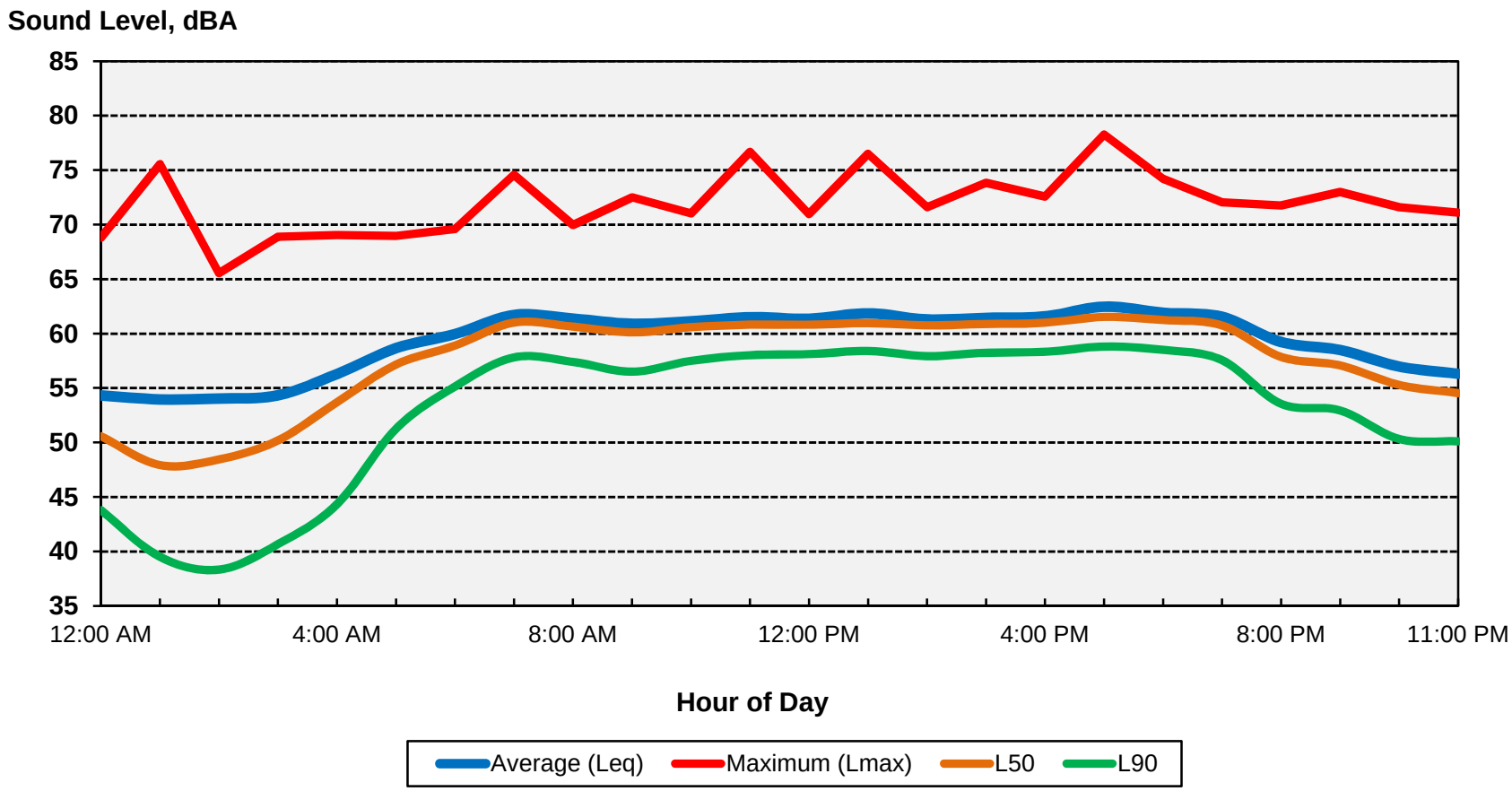
Appendix C-2
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Wednesday, December 31, 2014



Ldn: 64 dB

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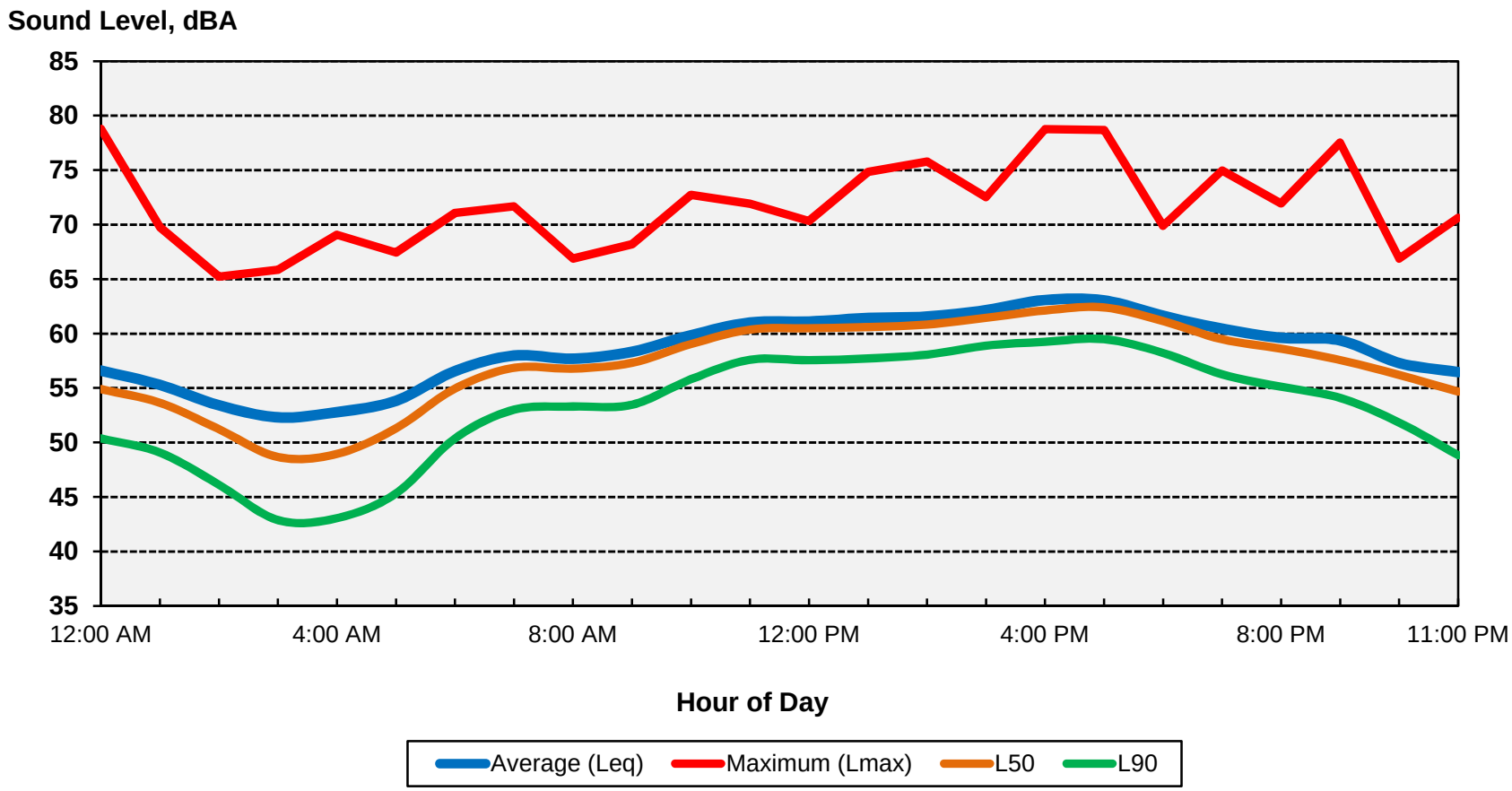
Appendix C-3
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 1
Thursday, January 01, 2015



Ldn: 63 dB

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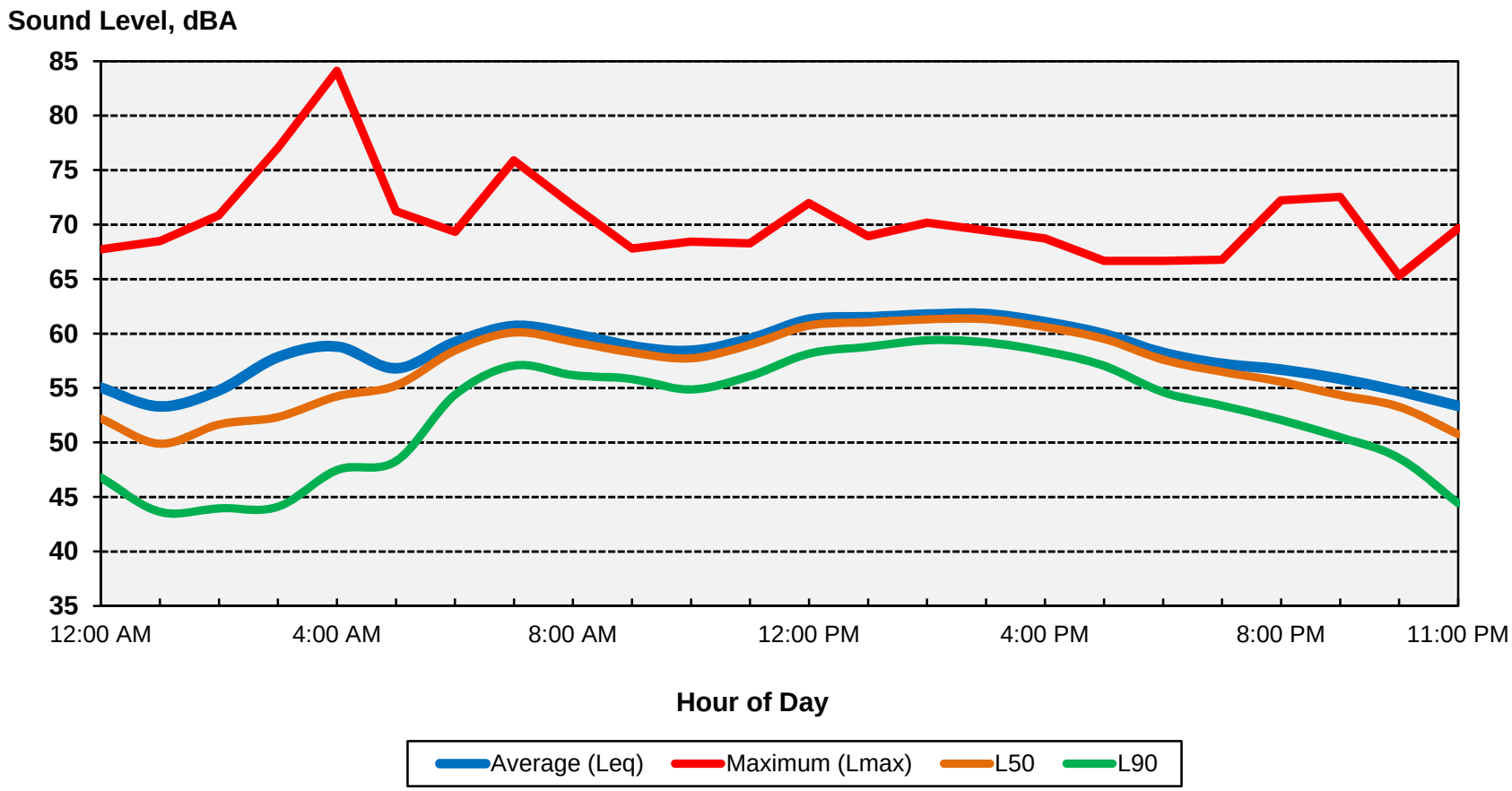
Appendix C-4
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Tuesday, December 30, 2014



Ldn: 64 dB

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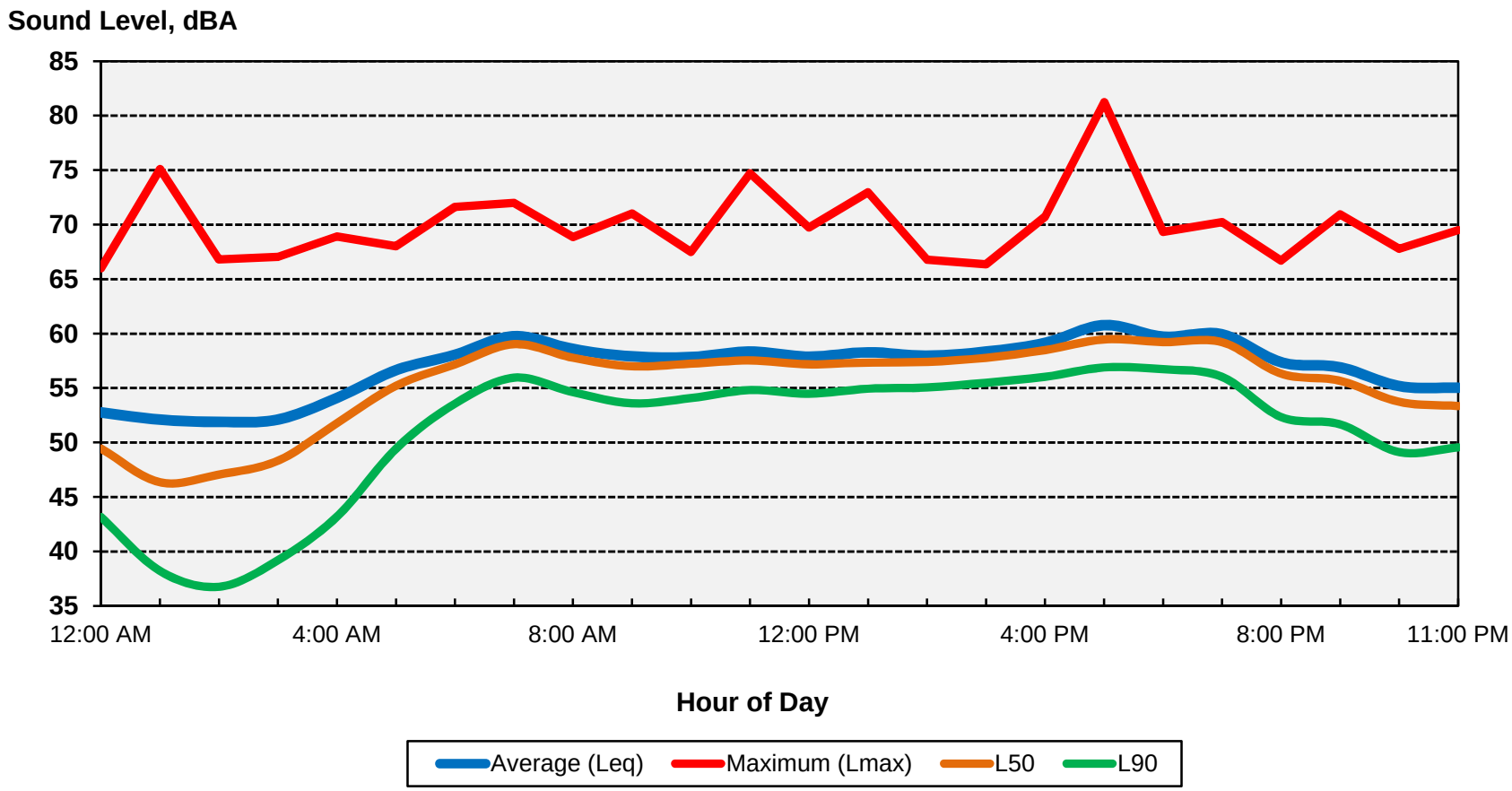
Appendix C-5
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Wednesday, December 31, 2014



Ldn: 62 dB

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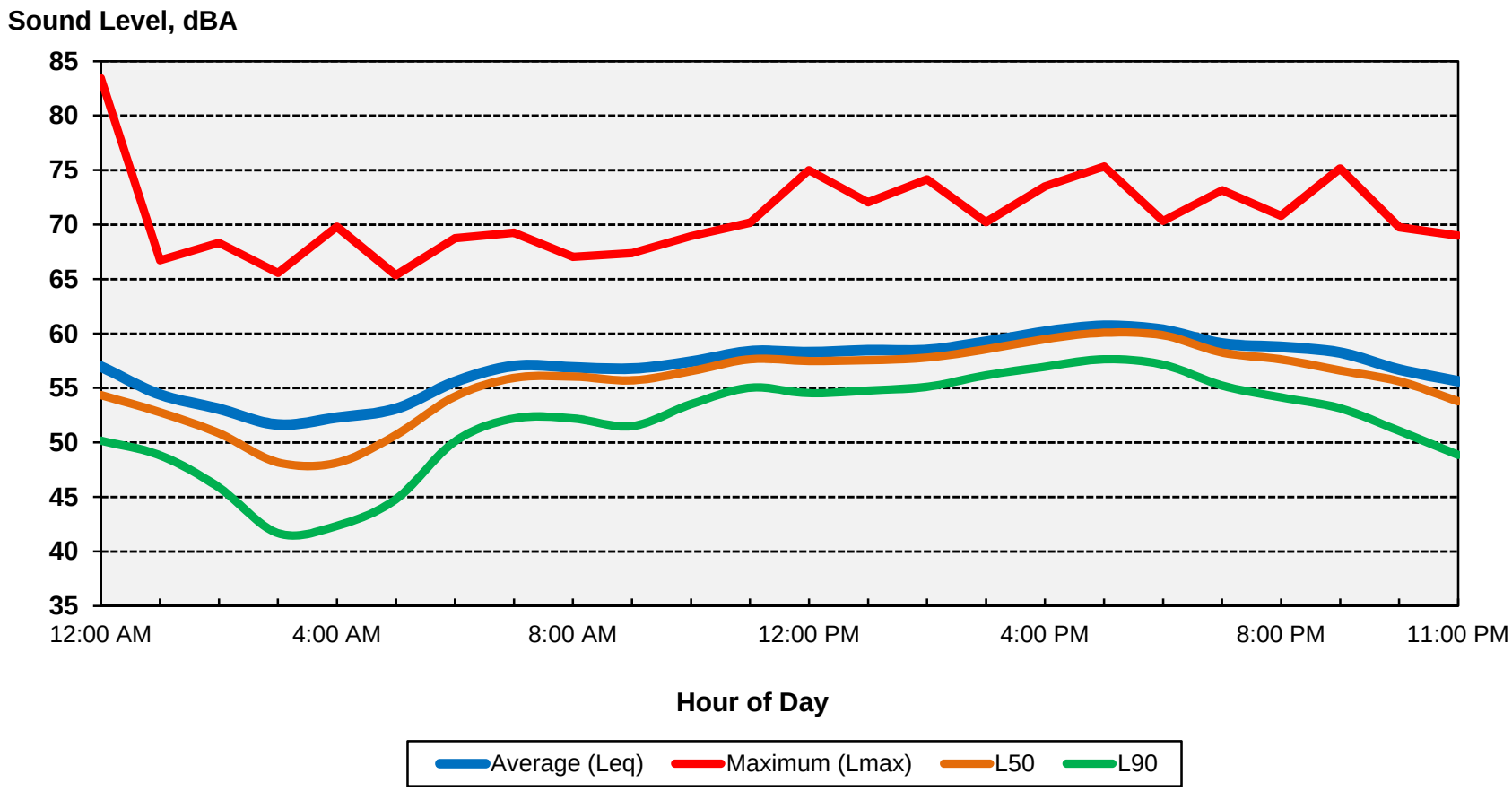
Appendix C-6
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 2
Thursday, January 01, 2015



Ldn: 62 dB

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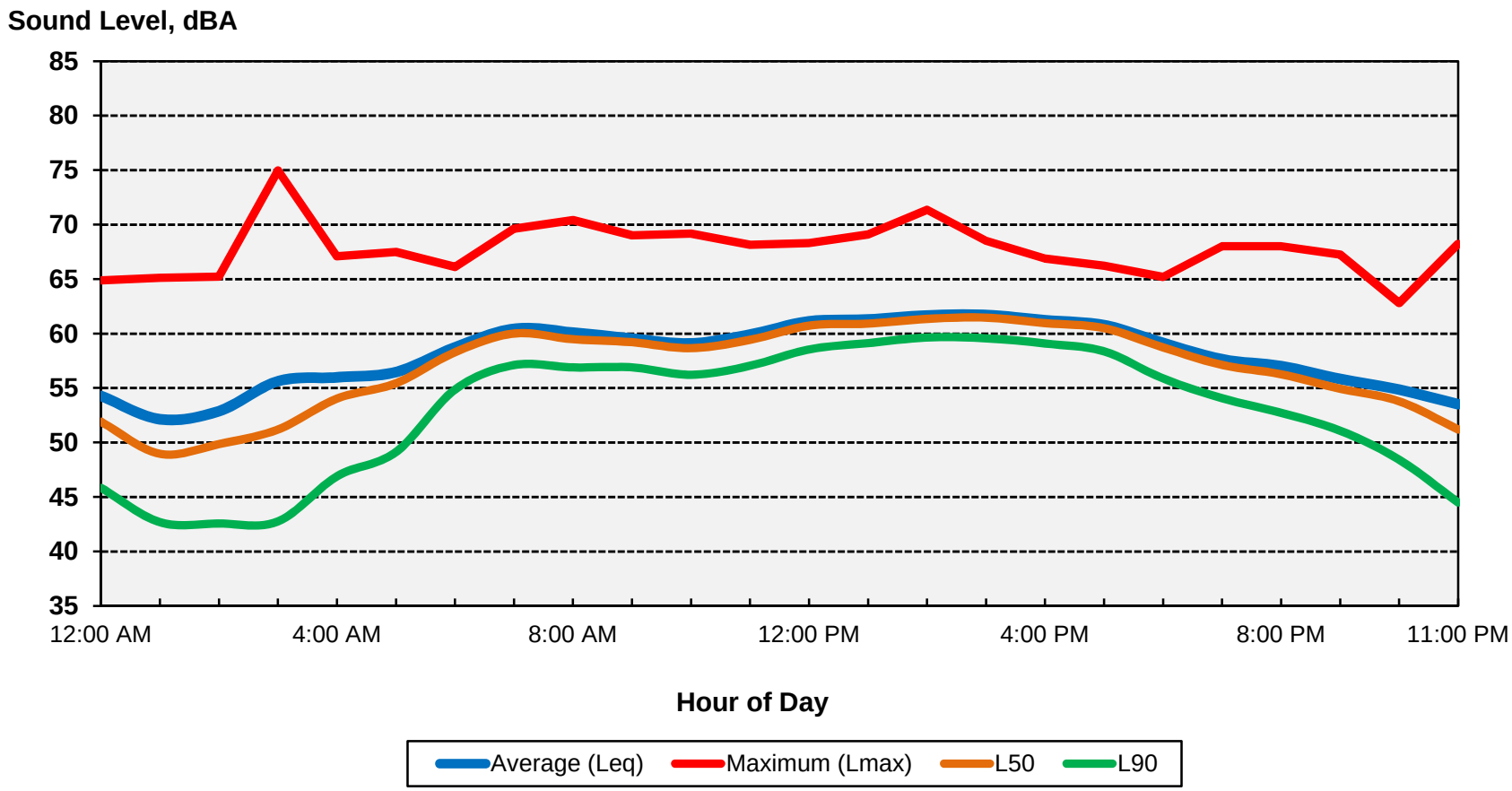
Appendix C-7
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Tuesday, December 30, 2014



Ldn: 63 dB

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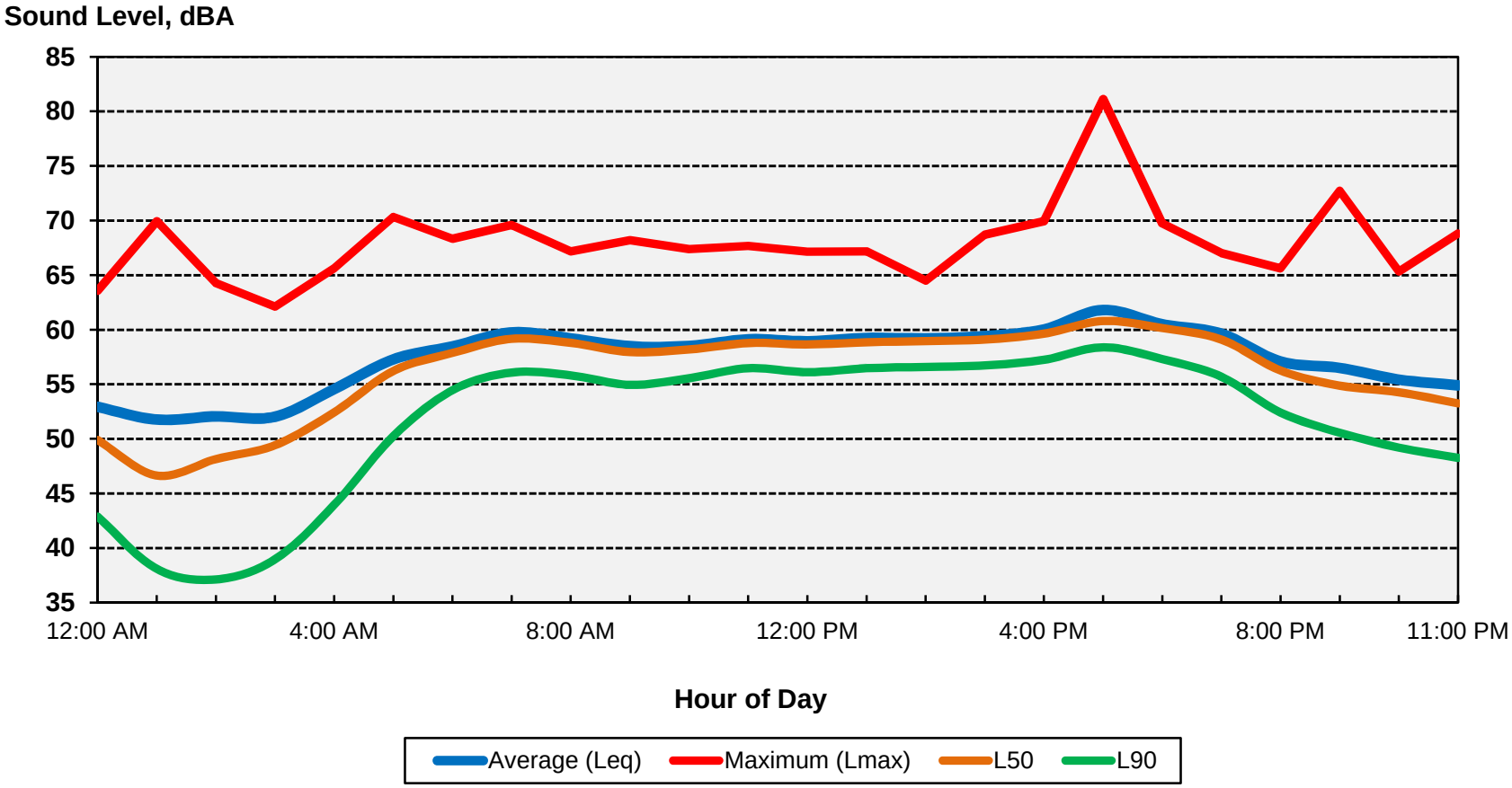
Appendix C-8
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Wednesday, December 31, 2014



Ldn: 62 dB

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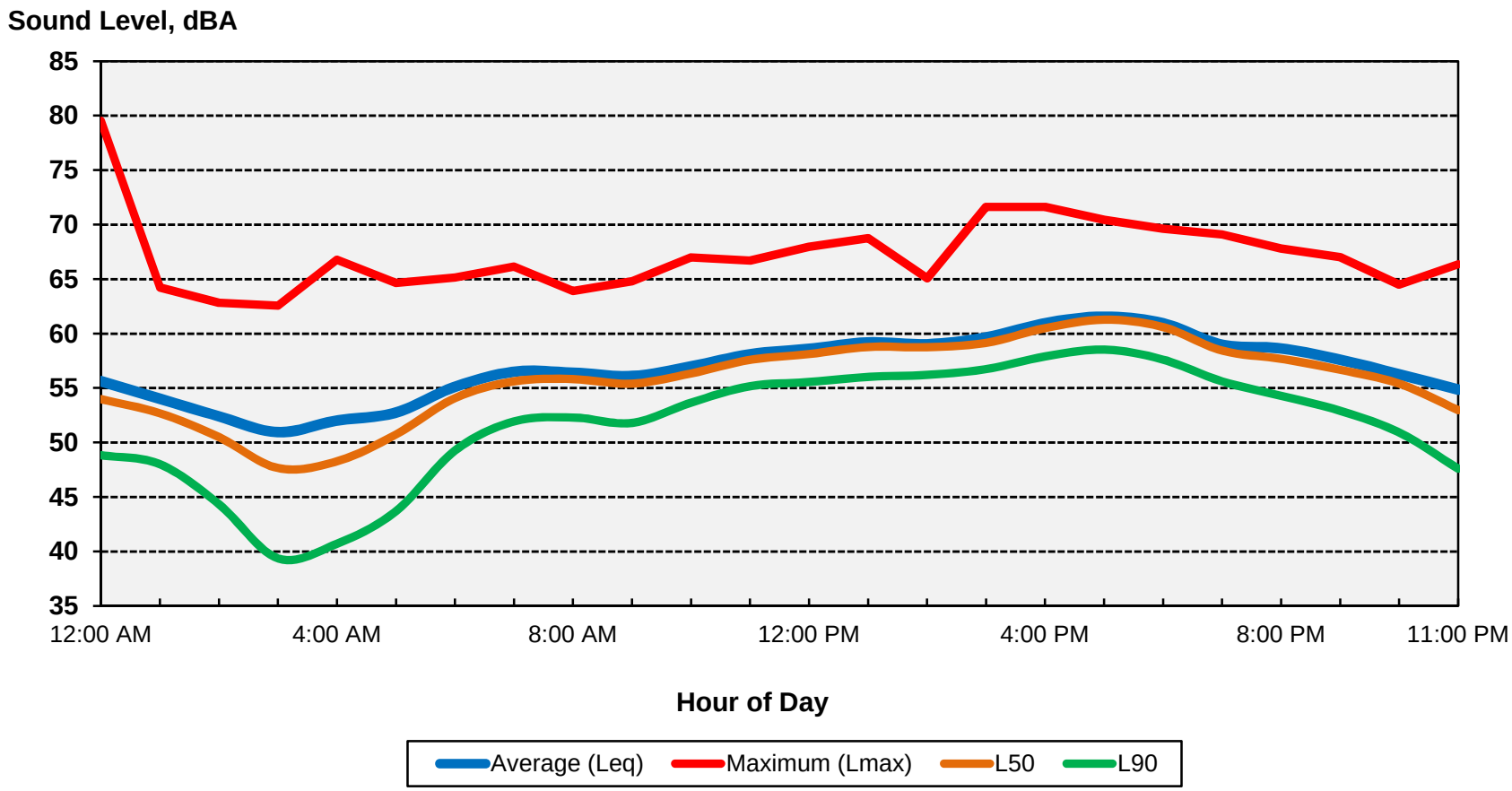
Appendix C-9
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 3
Thursday, January 01, 2015



Ldn: 62 dB

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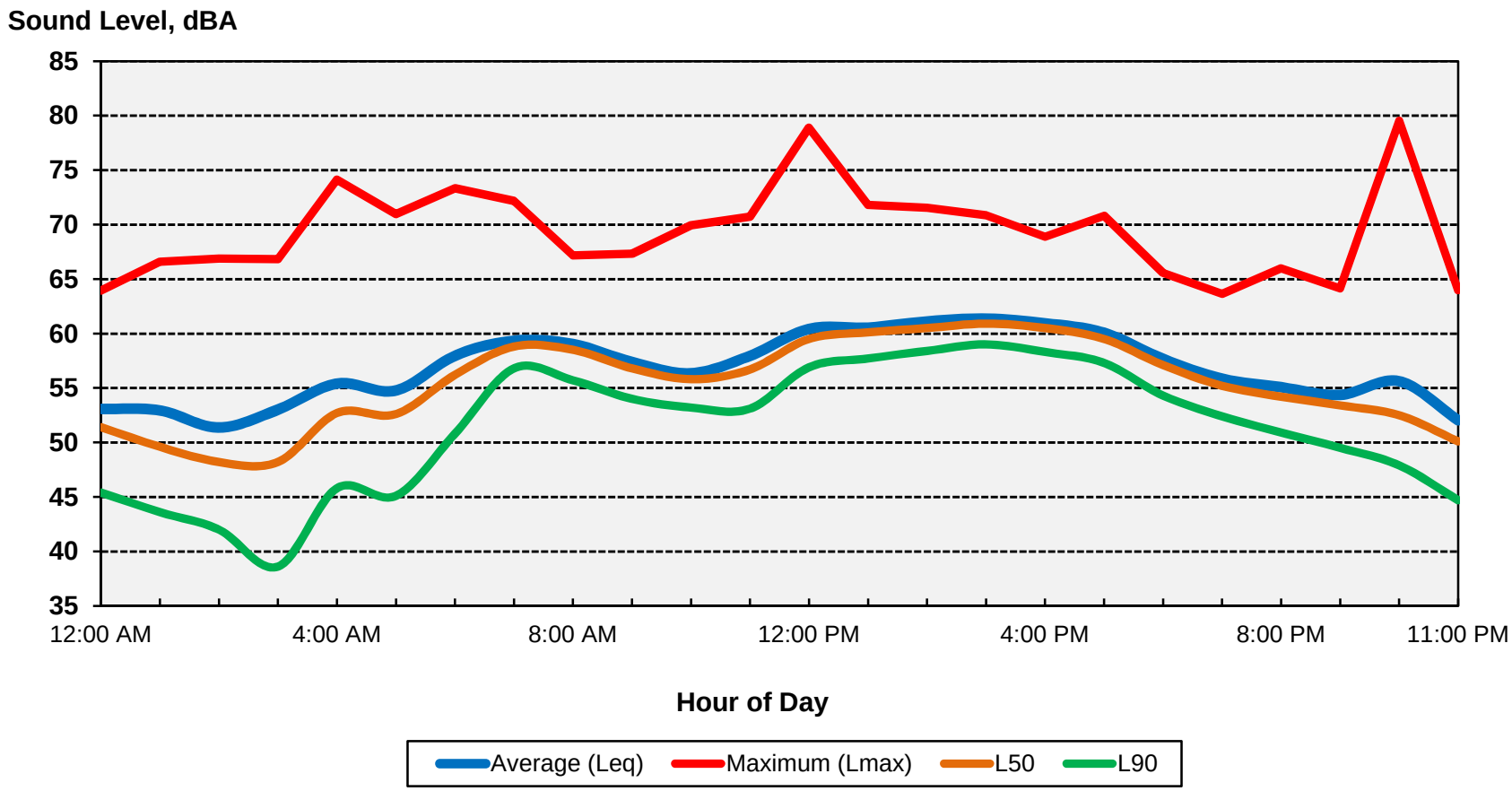
Appendix C-10
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Tuesday, December 30, 2014



Ldn: 62 dB

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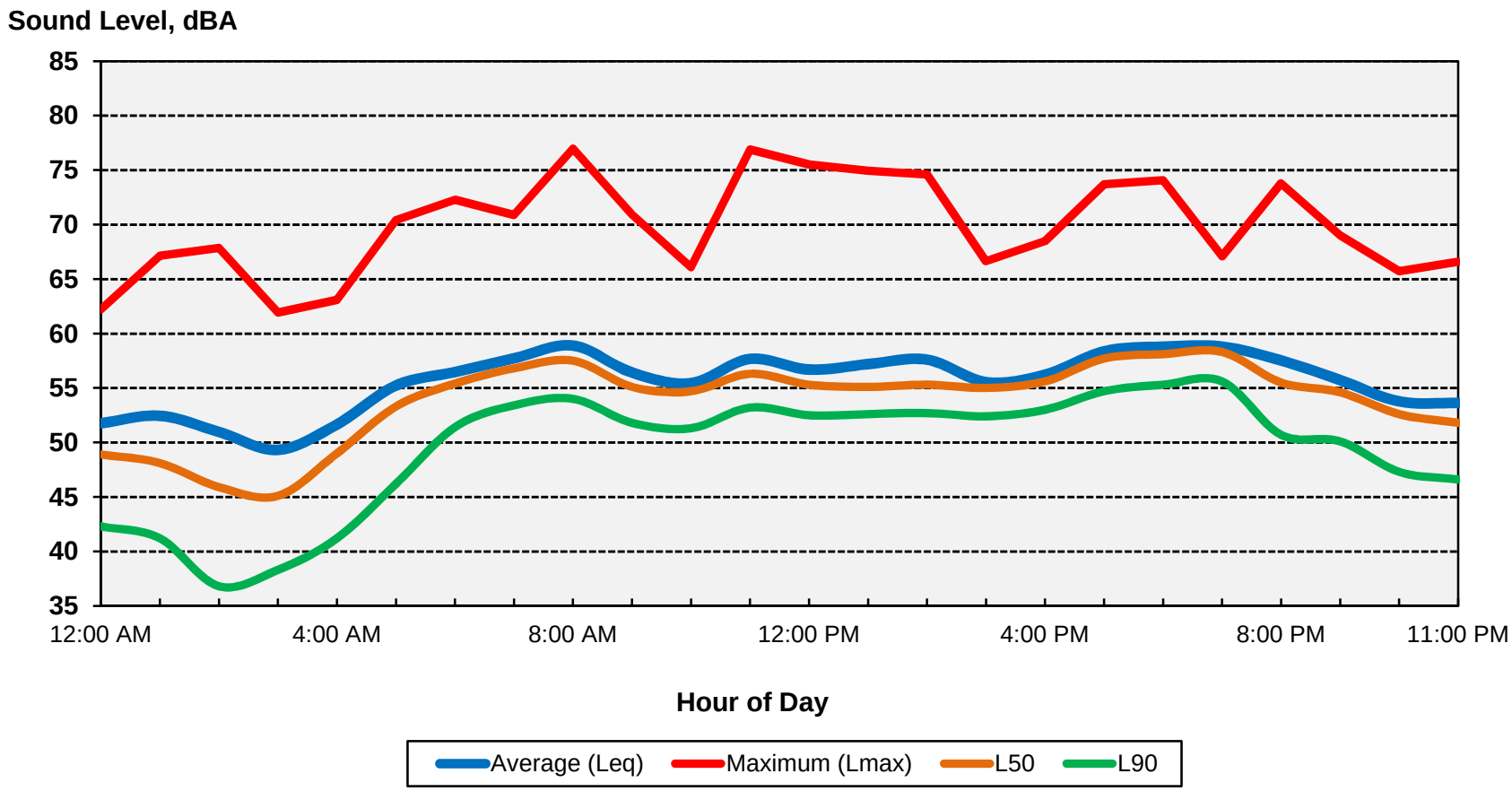
Appendix C-11
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Wednesday, December 31, 2014



Ldn: 61 dB

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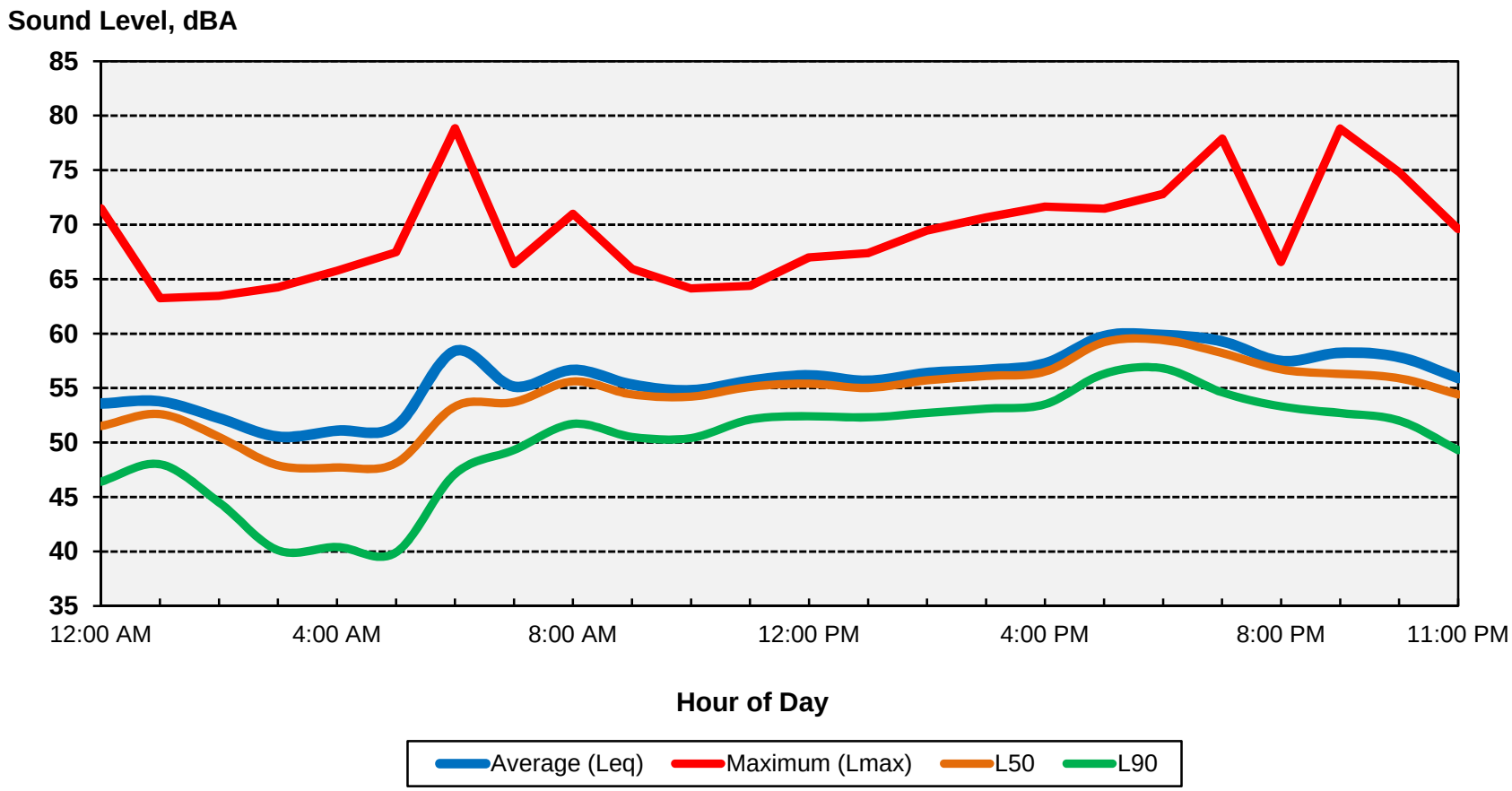
Appendix C-12
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 4
Thursday, January 01, 2015



Ldn: 62 dB

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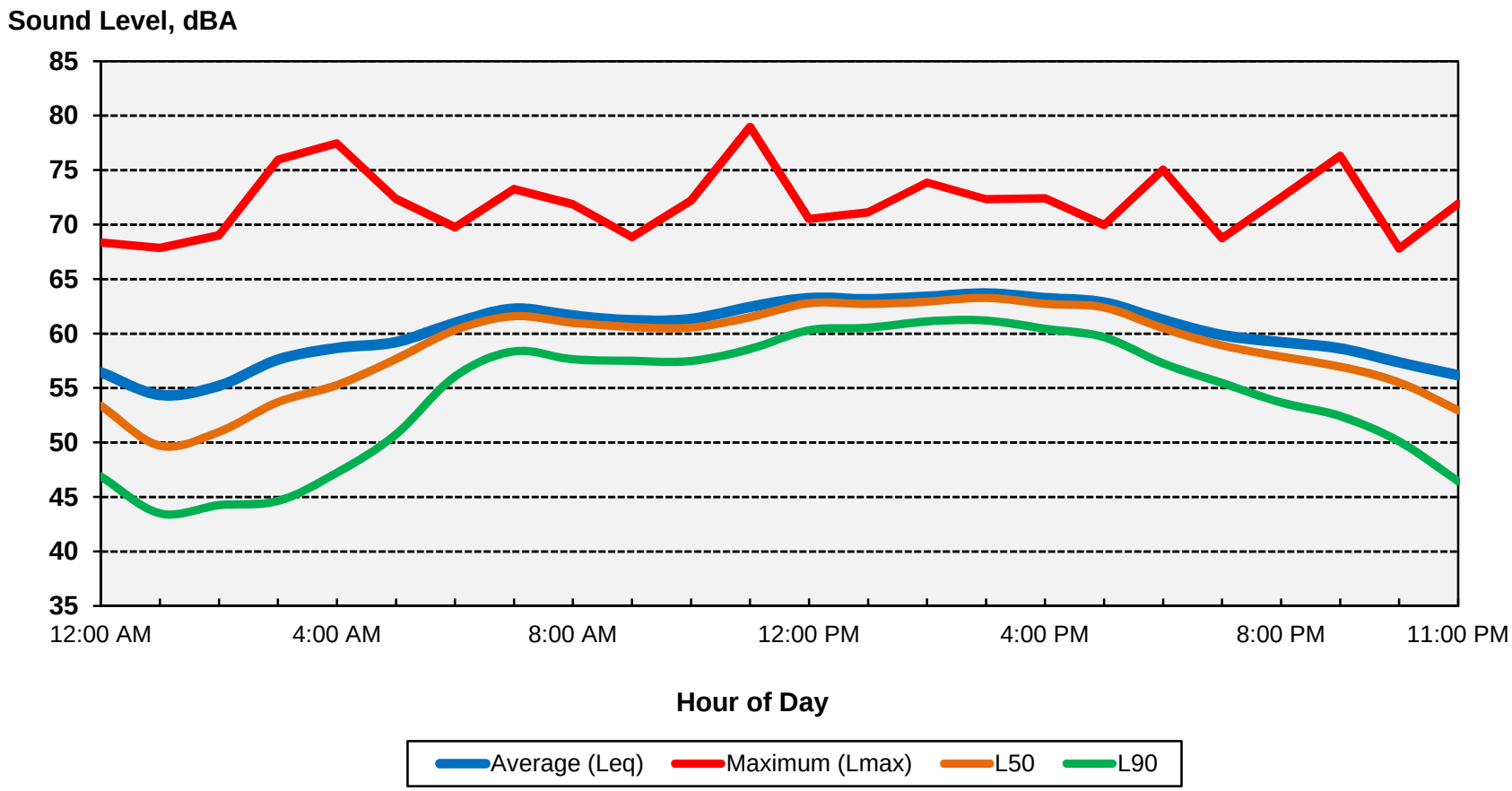
Appendix C-13
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Tuesday, December 30, 2014



Ldn: 65 dB

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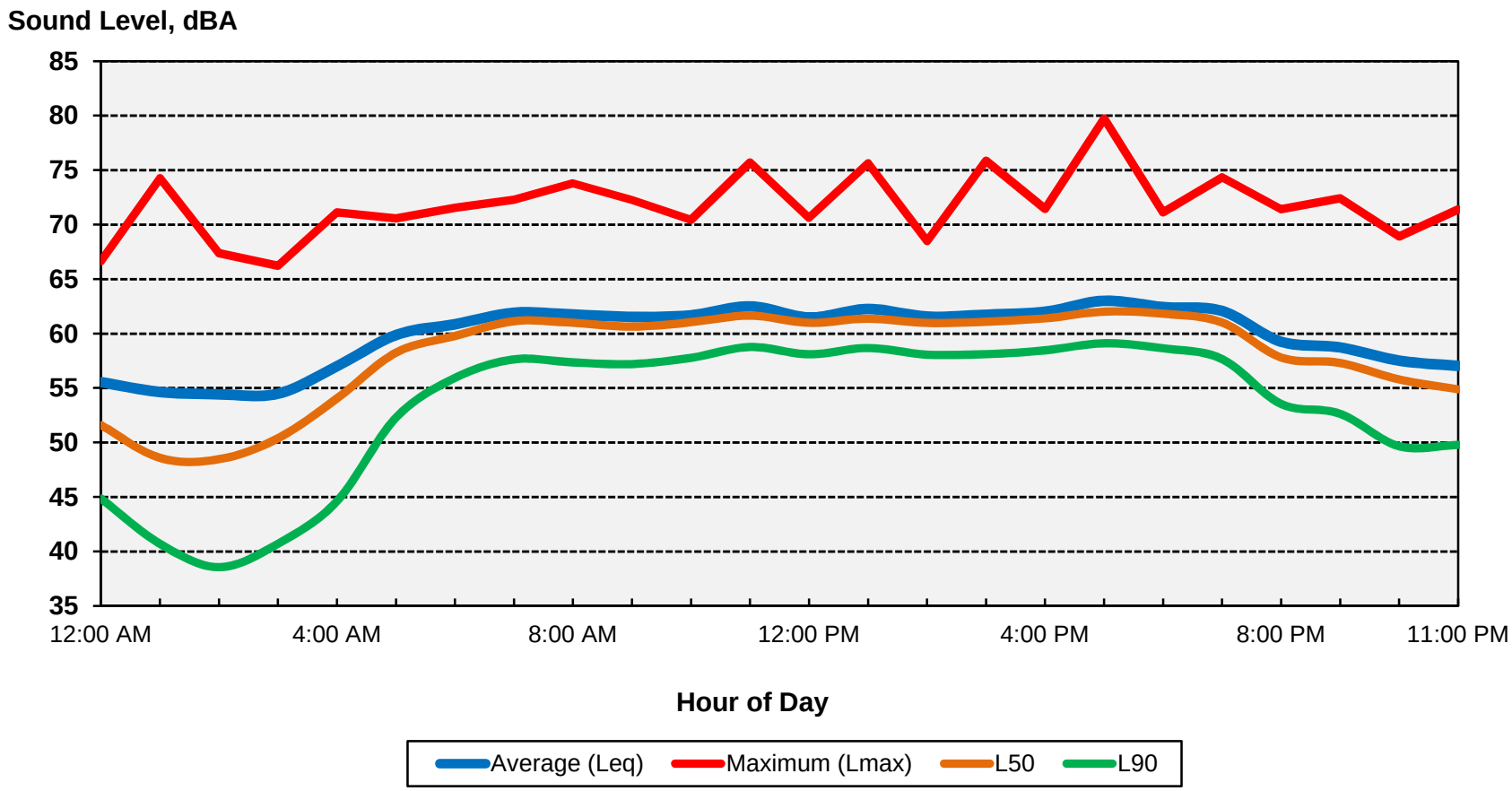
Appendix C-14
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Wednesday, December 31, 2014



Ldn: 65 dB

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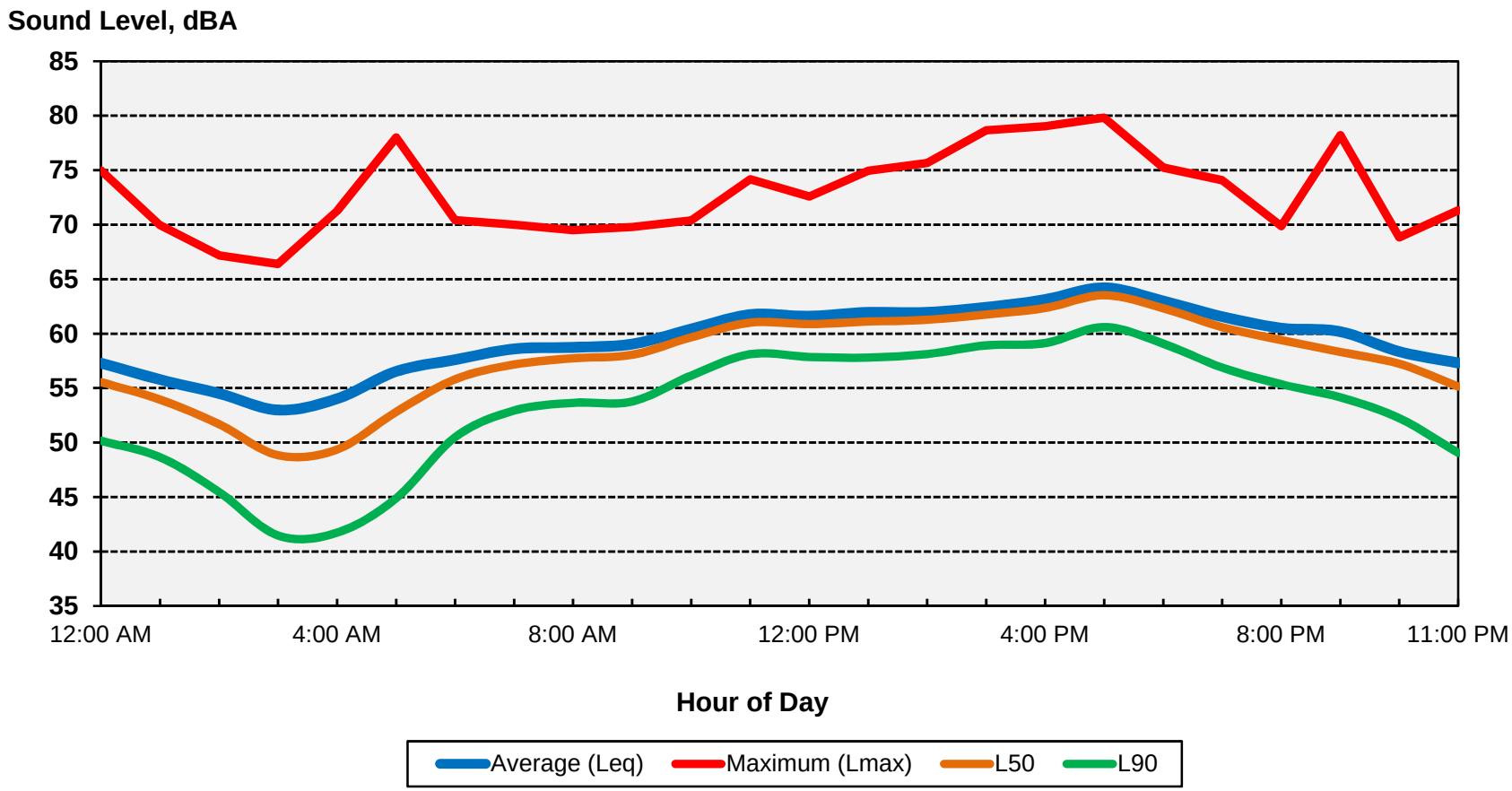
Appendix C-15
2014-298 Village at Loomis
Ambient Noise Monitoring Results - Site 5
Thursday, January 01, 2015



Ldn: 64 dB

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Appendix D-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80

Traffic Data:

Year:	Existing
Average Daily Traffic Volume:	84,000
Percent Daytime Traffic:	83
Percent Nighttime Traffic:	17
Percent Medium Trucks (2 axle):	1.5
Percent Heavy Trucks (3+ axle):	4.1
Assumed Vehicle Speed (mph):	65
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				----------L_{dn}, dB----------			
Location:	**Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	Site 1	210	-8	63	51	59	64
2	Site 2	230	-9	61	49	57	63
3	Site 3	300	-8	60	49	56	62
4	Site 4	310	-8	60	48	56	62
5	Site 5	250	-6	64	52	60	65

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	140
70	301
65	648
60	1397

Notes: Sites listed are long-term noise monitoring locations, shown in Figure 1, with offsets determined by subtracting measured levels from predicted levels.

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Appendix D-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Prediction Worksheet

Project Information:

Job Number:	2014-298
Project Name:	Village at Loomis
Roadway Name:	Interstate 80

Traffic Data:

Year:	2030
Average Daily Traffic Volume:	116,425
Percent Daytime Traffic:	83
Percent Nighttime Traffic:	17
Percent Medium Trucks (2 axle):	1.5
Percent Heavy Trucks (3+ axle):	4.1
Assumed Vehicle Speed (mph):	65
Intervening Ground Type (hard/soft):	**Soft**

Traffic Noise Levels:

				----------L_{dn}, dB----------			
Location:	**Description**	**Distance**	**Offset (dB)**	**Autos**	**Medium Trucks**	**Heavy Trucks**	**Total**
1	Offset Used	170	-4	69	58	65	71
2	Unshielded	170	0	73	62	69	75

Traffic Noise Contours (No Calibration Offset):

L_{dn} Contour, dB	Distance from Centerline, (ft)
75	174
70	374
65	806
60	1736

Notes: "Offset Used" is the -4 dB offset used for barrier calculations.
Future 2030 Interstate 80 traffic volume acquired from "Traffic Impact Analysis for the Village at Loomis" report prepared by KD Anderson & Associates, Inc., dated April 7, 2015.

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Appendix E-1

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Existing
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	10,603	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	19,037	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	16,344	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	6,464	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	14,452	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	14,452	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	15,706	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	8,107	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	1,152	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	518	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,600	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	676	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,760	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr	0	83			2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr	0	83			2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd	0	83			2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	100	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	84,000	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	0	83		17	2	1	25	100	

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Appendix E-2

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Existing + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	11,643	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	18,217	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	15,554	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	5,199	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	15,252	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	15,032	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	17,422	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	8,367	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	1,452	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	528	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,750	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	836	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,810	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr	6,140	83		17	2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr	3,300	83		17	2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd	2,800	83		17	2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	1,330	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	84,220	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	0	83		17	2	1	25	100	

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Appendix E-3

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Existing + Project + Roadway Changes
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	11,430	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	12,825	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	15,305	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	5,530	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	9,675	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	15,180	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	15,840	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	8,760	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	310	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	528	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,750	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	4,600	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,840	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr	6,140	83		17	2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr	3,300	83		17	2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd	2,800	83		17	2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	1,060	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	84,220	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	6,625	83		17	2	1	25	100	

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Appendix E-4

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Cumulative (2030)
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	13,460	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	23,760	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	18,350	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	9,290	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	17,850	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	17,850	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	17,560	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	12,295	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	1,452	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	528	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,750	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	836	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,810	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr		83			2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr		83			2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd		83			2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	100	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	117,700	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	0	83		17	2	1	25	100	

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Appendix E-5

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Cumulative + Project
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	13,850	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	23,300	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	17,960	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	8,920	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	18,350	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	17,500	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	22,200	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	11,700	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	1,452	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	528	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,750	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	1,050	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,810	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr	5,200	83		17	2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr	2,900	83		17	2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd	2,400	83		17	2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	1,900	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	116,425	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	0	83		17	2	1	25	100	

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Appendix E-6

FHWA-RD-77-108 Highway Traffic Noise Prediction Model
Data Input Sheet

Project #: 2014-298 Village at Loomis
Description: Cumulative + Project + Roadway Changes
Ldn/CNEL: Ldn
Hard/Soft: Soft

Segment	Roadway Name	Segment Description	ADT	Day %	Eve %	Night %	% Med. Trucks	% Hvy. Trucks	Speed	Distance	Offset (dB)
1	Taylor Road	South of Horseshoe Bar Rd	13,600	83		17	2	1	25	100	
2	Taylor Road	Horseshoe Bar Rd to Webb St	15,160	83		17	2	1	25	100	
3	Taylor Road	Webb St to King Rd	13,400	83		17	2	1	25	100	
4	King Road	Taylor Rd to Boyington Rd	9,580	83		17	2	1	35	100	
5	Horseshoe Bar Rd	Taylor Rd to Library Dr	10,300	83		17	2	1	25	100	
6	Horseshoe Bar Rd	Library Dr to Doc Barnes Dr	17,600	83		17	2	1	35	100	
7	Horseshoe Bar Rd	Doc Barnes Dr to I-80	22,200	83		17	2	1	35	100	
8	Horseshoe Bar Rd	I-80 to Laird Rd	11,700	83		17	2	1	35	100	
9	Day Avenue	King Rd to Project Site	591	83		17	2	1	25	100	
10	Laird Street	Horseshoe Bar Rd to Webb St	1,452	83		17	2	1	25	100	
11	Sun Knoll Drive	King Rd to Project Site	528	83		17	2	1	25	100	
12	Boyington Road	North of King Rd	2,750	83		17	2	1	35	100	
13	Webb Street	Taylor Rd to Laird St	8,750	83		17	2	1	25	100	
14	Webb Street	King Rd to Taylor Rd	3,810	83		17	2	1	25	100	
15	Doc Barnes Drive	Horseshoe Bar Rd to Gates Dr	5,200	83		17	2	1	25	100	
16	Doc Barnes Drive	Gates Dr to Blue Anchor Dr	2,900	83		17	2	1	25	100	
17	Doc Barnes Drive	Blue Anchor Dr to King Rd	2,400	83		17	2	1	25	100	
18	Library Drive	Horseshoe Bar Rd to Gates Dr	1,400	83		17	2	1	25	100	
19	Interstate 80	Horseshoe Bar Rd to Penryn Rd	116,425	83		17	1.5	4.1	65	100	
20	Webb Street	Laird St to Horseshoe Bar Rd	8,550	83		17	2	1	25	100	

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Appendix F-1

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80
Location(s): Property Line

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 69
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: Lot 209
Centerline to Barrier Distance (C_1): 170
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 375
Medium Truck Elevation: 377
Heavy Truck Elevation: 383
Pad/Ground Elevation at Receiver: 384
Receiver Elevation[1]: 389
Base of Barrier Elevation: 384
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	---------- L_{dn}, dB ---------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
390	6	63	51	60	**65**	Yes	Yes	Yes
391	7	62	50	59	**64**	Yes	Yes	Yes
392	8	60	49	57	**62**	Yes	Yes	Yes
393	9	59	48	56	**61**	Yes	Yes	Yes
394	10	59	47	55	**60**	Yes	Yes	Yes
395	11	58	46	54	**60**	Yes	Yes	Yes
396	12	57	45	53	**59**	Yes	Yes	Yes
397	13	56	44	53	**58**	Yes	Yes	Yes
398	14	55	44	52	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-2

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80
Location(s): Property Line

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 69
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: Lot 245
Centerline to Barrier Distance (C_1): 170
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 378
Medium Truck Elevation: 380
Heavy Truck Elevation: 386
Pad/Ground Elevation at Receiver: 388
Receiver Elevation[1]: 393
Base of Barrier Elevation: 388
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	---------- L_{dn}, dB ---------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
394	6	63	51	60	**65**	Yes	Yes	Yes
395	7	62	50	59	**64**	Yes	Yes	Yes
396	8	60	49	57	**62**	Yes	Yes	Yes
397	9	59	48	56	**61**	Yes	Yes	Yes
398	10	59	47	55	**60**	Yes	Yes	Yes
399	11	58	46	54	**60**	Yes	Yes	Yes
400	12	57	45	53	**59**	Yes	Yes	Yes
401	13	56	44	53	**58**	Yes	Yes	Yes
402	14	55	44	52	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-3

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80
Location(s): Property Line

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 69
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: Lot 264
Centerline to Barrier Distance (C_1): 170
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 380
Medium Truck Elevation: 382
Heavy Truck Elevation: 388
Pad/Ground Elevation at Receiver: 388
Receiver Elevation[1]: 393
Base of Barrier Elevation: 388
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	---------- L_{dn}, dB ---------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
394	6	63	51	60	**65**	Yes	Yes	Yes
395	7	62	50	59	**64**	Yes	Yes	Yes
396	8	61	49	57	**63**	Yes	Yes	Yes
397	9	60	48	56	**61**	Yes	Yes	Yes
398	10	59	47	55	**61**	Yes	Yes	Yes
399	11	58	46	54	**60**	Yes	Yes	Yes
400	12	57	45	54	**59**	Yes	Yes	Yes
401	13	56	44	53	**58**	Yes	Yes	Yes
402	14	56	44	52	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-4

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80
Location(s): Property Line

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 69
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: Lot 294
Centerline to Barrier Distance (C_1): 200
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 381
Medium Truck Elevation: 383
Heavy Truck Elevation: 389
Pad/Ground Elevation at Receiver: 393
Receiver Elevation[1]: 398
Base of Barrier Elevation: 393
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	---------- L_{dn}, dB ---------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
399	6	63	51	60	**65**	Yes	Yes	Yes
400	7	62	50	58	**64**	Yes	Yes	Yes
401	8	60	49	57	**62**	Yes	Yes	Yes
402	9	59	48	56	**61**	Yes	Yes	Yes
403	10	59	47	55	**60**	Yes	Yes	Yes
404	11	58	46	54	**60**	Yes	Yes	Yes
405	12	57	45	53	**59**	Yes	Yes	Yes
406	13	56	44	53	**58**	Yes	Yes	Yes
407	14	55	44	52	**57**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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Appendix F-5

FHWA Traffic Noise Prediction Model (FHWA-RD-77-108)
Noise Barrier Effectiveness Prediction Worksheet

Project Information:

Job Number: 2014-298
Project Name: Village at Loomis
Roadway Name: Interstate 80
Location(s): Property Line

Noise Level Data:

Year: 2030
Auto L_{dn}, dB: 69
Medium Truck L_{dn}, dB: 58
Heavy Truck L_{dn}, dB: 65

Site Geometry:

Receiver Description: Lot 290
Centerline to Barrier Distance (C_1): 200
Barrier to Receiver Distance (C_2): 15
Automobile Elevation: 381
Medium Truck Elevation: 383
Heavy Truck Elevation: 389
Pad/Ground Elevation at Receiver: 386
Receiver Elevation[1]: 391
Base of Barrier Elevation: 386
Starting Barrier Height 6

Barrier Effectiveness:

Top of Barrier Elevation (ft)	Barrier Height[2] (ft)	---------- L_{dn}, dB ---------- Autos	Medium Trucks	Heavy Trucks	Total	Barrier Breaks Line of Sight to… Autos?	Medium Trucks?	Heavy Trucks?
392	6	63	52	60	**65**	Yes	Yes	Yes
393	7	62	51	59	**64**	Yes	Yes	Yes
394	8	61	49	58	**63**	Yes	Yes	Yes
395	9	60	48	57	**62**	Yes	Yes	Yes
396	10	59	47	55	**61**	Yes	Yes	Yes
397	11	58	47	55	**60**	Yes	Yes	Yes
398	12	57	46	54	**59**	Yes	Yes	Yes
399	13	56	45	53	**58**	Yes	Yes	Yes
400	14	56	44	52	**58**	Yes	Yes	Yes

Notes: 1.Standard receiver elevation is five feet above grade/pad elevations at the receiver location(s)

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