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January 18, 2019
Project No: 18-06854

Ken Landis
Landex Corporation, LLC
Via email: ken@landexcorp.com

Subject: **Construction Noise Memorandum for the 9611 Hillside Road Residential Project 9611 Hillside Road, Rancho Cucamonga, California 91737**

Dear Mr. Landis:

This memorandum evaluates potential noise impacts associated with construction of the 9611 Hillside Road residential project in the city of Rancho Cucamonga, California. The project would involve subdivision of a 3.04-acre parcel (Assessor's Parcel Number: 1061-571-01) into four, single-family residential parcels. Three new single-family residences of up to 3,000 square feet would be constructed, as well as a 0.41-acre cul-de-sac ("Street A") extending south from Hillside Road. The existing approximately 3,500-square foot residence would remain on the fourth lot in the northwest corner of the project site. Project site plans are included in Appendix A.

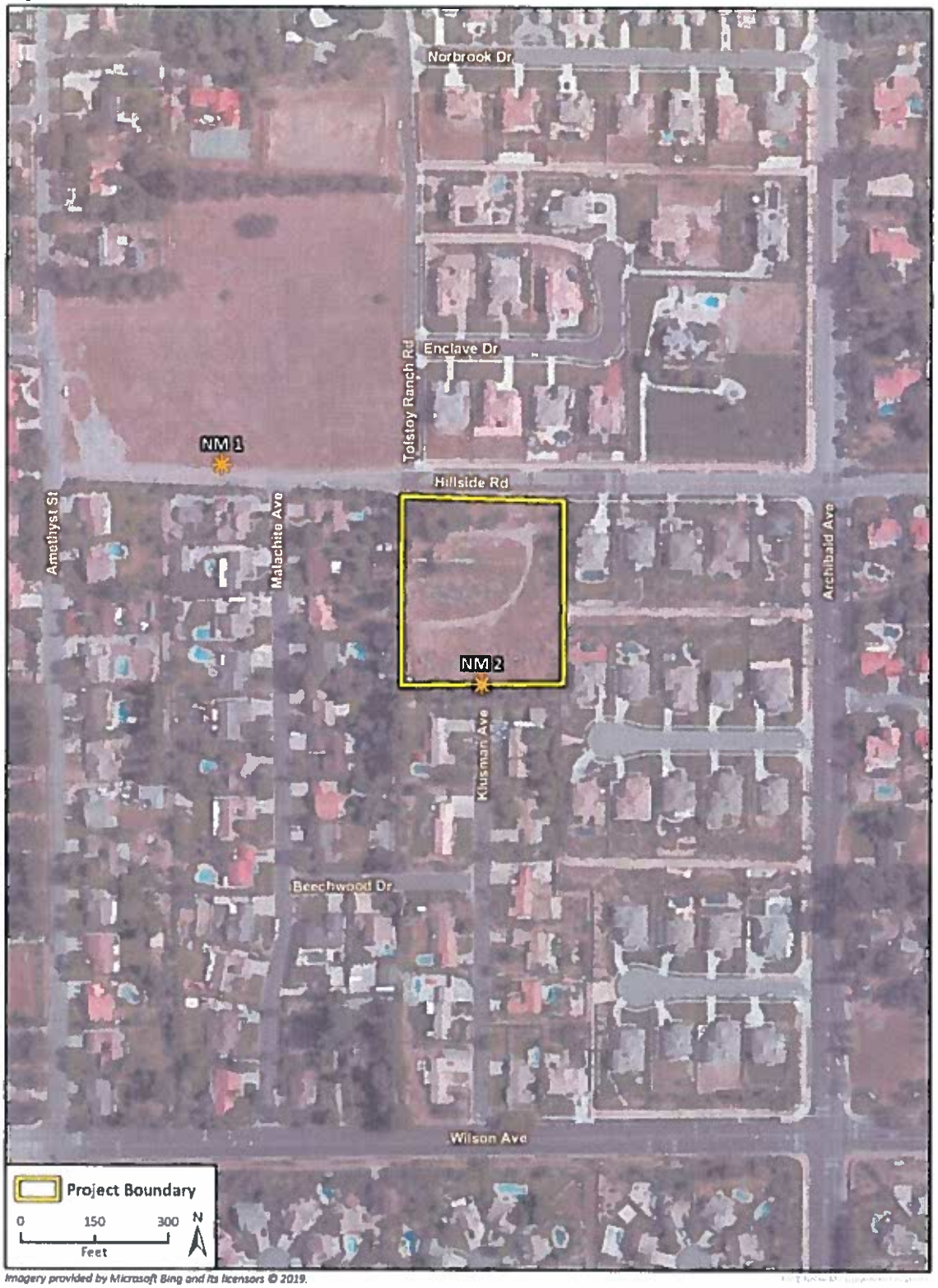
The project site is located in a residential area of the city of Rancho Cucamonga, south of Hillside Road between Archibald Avenue and Malachite Avenue. The project site and all adjacent parcels are located in the Very Low (VL) Residential zone, according to the City of Rancho Cucamonga Zoning Map (City of Rancho Cucamonga 2012), and have a General Plan Land Use Designation of Very Low Residential (0.1-2.0 dwelling units/acre)(City of Rancho Cucamonga 2010). Single-family residences surround the project site on all sides. Additionally, there are residential properties across Hillside Road approximately 80 feet north of the site. Single-family residences are located immediately to the east of the project site and separated by an approximately eight-foot high brick wall. Single-family residential parcels along Malachite Avenue are located immediately west of the project site, separated by existing approximately six-foot tall cinderblock walls. Finally, single-family residences along Klusman Avenue share the project site's southern property line.

The purpose of this memorandum is to evaluate noise impacts associated with the project's construction, including grading activities and house construction, at the residential land uses surrounding the project site.

Noise Fundamentals

Sound is a vibratory disturbance created by a moving or vibrating source, which is capable of being detected by the hearing organs. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired and may therefore be classified as a more specific group of sounds. Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels to be consistent with that of human hearing response, which is most sensitive to frequencies around 4,000 Hertz and less sensitive to low frequencies (below 100 Hertz).

Figure 1 Noise Measurement Locations



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- Basic Noise Level plus 5 dBA for a cumulative period of not more than 10 minutes in any one hour; or
- Basic Noise Level plus 14 dBA for a cumulative period of not more than 5 minutes in any one hour; or
- Basic Noise level plus 15 dBA at any time.

Section 17.66.050(D) excludes the following applicable activities from the noise standards:

- Any mechanical device, apparatus, or equipment used, related to, or connected with emergency machinery, vehicle, work, or warning alarm or bell, provided the sounding of any bell or alarm on any building or vehicle terminates its operation within 30 minutes in any hour of being activated.
- Noise sources associated with, or vibration created by, construction, repair, remodeling, or grading of any real property or during authorized seismic surveys, provided said activities:
    a. When adjacent to a residential land use, school, church or similar type of use, the noise generating activity does not take place between the hours of 8:00 p.m. and 7:00 a.m. on weekdays, including Saturday, or at any time on Sunday or a national holiday, and provided noise levels created do not exceed the noise standard of 65 dBA when measured at the adjacent property line.
    b. When adjacent to a commercial or industrial use, the noise generating activity does not take place between the hours of 10:00 p.m. and 6:00 a.m. on weekdays, including Saturday and Sunday, and provided noise levels created do not exceed the noise standards of 70 dBA when measured at the adjacent property line.
- Noise sources associated with the maintenance of real property, provided said activities take place between the hours of 7:00 a.m. and 8:00 p.m. on any day
- Any activity to the extent regulation thereof has been preempted by state or federal law.

Construction Noise Impacts

The project would generate temporary noise and includes site preparation and grading, construction of three homes, and paving of a 0.41-acre cul-de-sac. Construction is anticipated to last approximately 17 months (Landin & Associates 2018). Pursuant to Section 17.66.050(D), construction would only occur Monday through Saturday between 7:00 AM – 8:00 PM. No construction would occur on Sundays or federal holidays.

For purposes of construction noise assessment, construction equipment can be considered to operate in two modes, stationary and mobile. As a general rule, stationary equipment operates in one location for one or more days at a time, with either a fixed-power operation, such as, pumps, generators, and compressors, or a variable noise operation, such as pile drivers, rock drills, and pavement breakers. Mobile equipment moves around the construction site with power applied in cyclic fashion, such as bulldozers, graders, and loaders (FTA 2018). Noise impacts from stationary equipment are assessed from the center of the equipment, while noise impacts for mobile construction equipment are assessed from the center of the equipment activity area (i.e., construction site). For linear construction, such as a roadway or pipeline, construction noise is assessed from the centerline of the alignment based on the distance worked in an hour.

Variation in power imposes additional complexity in characterizing the noise source level from construction equipment. Power variation is accounted for by describing the noise at a reference distance from the equipment operating at full power and adjusting it based on the duty cycle of the activity to determine the L_{eq} of the operation (FHWA 2006).

To comply with the City of Rancho Cucamonga Development Code, the project shall incorporate one of the following measures into project construction:

Noise Abatement Measure-1

- An industrial grade muffler or muffler of similar capacity capable of reducing engine noise by at least 15 dBA shall be installed on all mobile construction equipment, including but not limited to the following: cranes, backhoes, tractors, dozers, graders, scrapers, forklifts, pavers, and rollers (see Appendix D). Stationary sources that would be located within 100 feet of residences shall be partially enclosed by materials capable of reducing noise levels by at least 10 dBA, such as Echo Barrier (Appendix D); or,

Noise Abatement Measure-2

- Noise barriers with a minimum height of 12 feet shall be erected along the boundary of the yard (Appendix E). The noise barriers shall be constructed of material with a minimum weight of two pounds per square foot with no gaps or perforations. Noise barriers may be constructed of, but not limited to, 5/8-inch plywood, 5/8-inch oriented strand board, and hay bales.

Conclusion and Recommendation

Unabated construction noise is anticipated to result in noise levels in excess of the City's 65 dBA L_{eq} residential standard at adjacent properties during construction. Therefore, to comply with the City's construction noise level limit, two options are available to the project: Noise Abatement Measure-1 requires the installation of silencers on all on-site mobile construction equipment and sound enclosures for all on-site stationary equipment. Alternatively, Noise Abatement Measure-2 requires construction of a temporary noise barrier along the project boundary at a height of 12 feet above the surface elevation. Industrial grade mufflers specifications demonstrating noise levels reductions of at least 15 dBA at 50 feet of distance are included in Appendix D. Sound enclosure materials that would reduce noise from stationary equipment by at least 10 dBA are also included in Appendix D.

Limiting construction activities to 7:00 AM – 8:00 PM on weekdays and Saturdays would further reduce noise exposure at nearby sensitive receptors and comply with the City of Rancho Cucamonga Development Code. With adherence to either of the noise abatement measures in this memorandum, project construction noise impacts would comply with City construction noise standards.

Sincerely,

John Sisser, MESM
Associate Environmental Planner

Erik Feldman, MS, LEED AP
Principal

Reviewed by:

William A. Maddux
Senior Environmental Specialist

Appendix A

Site Plan

Appendix B

Noise Measurement Data

86	2019/01/08	08:53:49	43.4
87	2019/01/08	08:53:50	43.1
88	2019/01/08	08:53:51	43.8
89	2019/01/08	08:53:52	45.1
90	2019/01/08	08:53:53	42.0
91	2019/01/08	08:53:54	43.3
92	2019/01/08	08:53:55	43.5
93	2019/01/08	08:53:56	43.3
94	2019/01/08	08:53:57	42.8
95	2019/01/08	08:53:58	42.9
96	2019/01/08	08:53:59	43.2
97	2019/01/08	08:54:00	45.0
98	2019/01/08	08:54:01	46.6
99	2019/01/08	08:54:02	49.8
100	2019/01/08	08:54:03	54.0
101	2019/01/08	08:54:04	57.6
102	2019/01/08	08:54:05	63.3
103	2019/01/08	08:54:06	66.3
104	2019/01/08	08:54:07	72.3
105	2019/01/08	08:54:08	69.5
106	2019/01/08	08:54:09	63.3
107	2019/01/08	08:54:10	61.0
108	2019/01/08	08:54:11	57.0
109	2019/01/08	08:54:12	54.4
110	2019/01/08	08:54:13	51.2
111	2019/01/08	08:54:14	49.0
112	2019/01/08	08:54:15	47.3
113	2019/01/08	08:54:16	46.0
114	2019/01/08	08:54:17	45.2
115	2019/01/08	08:54:18	45.0
116	2019/01/08	08:54:19	43.8
117	2019/01/08	08:54:20	43.6
118	2019/01/08	08:54:21	43.6
119	2019/01/08	08:54:22	43.8
120	2019/01/08	08:54:23	42.0
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129	2019/01/08	08:54:32	40.2
130	2019/01/08	08:54:33	40.4
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132	2019/01/08	08:54:35	40.1
133	2019/01/08	08:54:36	39.5
134	2019/01/08	08:54:37	40.7
135	2019/01/08	08:54:38	40.9
136	2019/01/08	08:54:39	40.6
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139	2019/01/08	08:54:42	40.4
140	2019/01/08	08:54:43	39.9
141	2019/01/08	08:54:44	40.0
142	2019/01/08	08:54:45	41.0
143	2019/01/08	08:54:46	43.7
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241	2019/01/08	08:32:47	43.1
242	2019/01/08	08:32:48	43.6
243	2019/01/08	08:32:49	42.7
244	2019/01/08	08:32:50	43.5
245	2019/01/08	08:32:51	42.7
246	2019/01/08	08:32:52	42.2
247	2019/01/08	08:32:53	40.0
248	2019/01/08	08:32:54	41.4
249	2019/01/08	08:32:55	43.0
250	2019/01/08	08:32:56	41.7
251	2019/01/08	08:32:57	40.3
252	2019/01/08	08:32:58	41.7
253	2019/01/08	08:32:59	43.0
254	2019/01/08	08:33:00	42.3
255	2019/01/08	08:33:01	42.0
256	2019/01/08	08:33:02	41.4
257	2019/01/08	08:33:03	41.9
258	2019/01/08	08:33:04	41.6
259	2019/01/08	08:33:05	42.4
260	2019/01/08	08:33:06	44.8
261	2019/01/08	08:33:07	41.7
262	2019/01/08	08:33:08	42.1
263	2019/01/08	08:33:09	41.6
264	2019/01/08	08:33:10	41.8
265	2019/01/08	08:33:11	41.3
266	2019/01/08	08:33:12	41.9
267	2019/01/08	08:33:13	41.4
268	2019/01/08	08:33:14	40.8
269	2019/01/08	08:33:15	48.8
270	2019/01/08	08:33:16	41.5
271	2019/01/08	08:33:17	41.5
272	2019/01/08	08:33:18	42.6
273	2019/01/08	08:33:19	49.0
274	2019/01/08	08:33:20	46.6
275	2019/01/08	08:33:21	42.2
276	2019/01/08	08:33:22	42.0
277	2019/01/08	08:33:23	41.8
278	2019/01/08	08:33:24	43.0
279	2019/01/08	08:33:25	41.7
280	2019/01/08	08:33:26	40.6
281	2019/01/08	08:33:27	40.5
282	2019/01/08	08:33:28	41.0
283	2019/01/08	08:33:29	43.4

Freq Weight : A
Time Weight : FAST
Level Range : 40-100
Max dB : 66.4 - 2019/01/08 08:37:05
Level Range : 40-100
SEL : 77.2
Leq : 47.7

No.s	Date Time	(dB)
1	2019/01/08 08:28:47	45.9
2	2019/01/08 08:28:48	46.3
3	2019/01/08 08:28:49	45.7
4	2019/01/08 08:28:50	45.4
5	2019/01/08 08:28:51	45.3
6	2019/01/08 08:28:52	46.1
7	2019/01/08 08:28:53	45.6
8	2019/01/08 08:28:54	44.1
9	2019/01/08 08:28:55	44.5
10	2019/01/08 08:28:56	44.1
11	2019/01/08 08:28:57	43.7
12	2019/01/08 08:28:58	44.1
13	2019/01/08 08:28:59	46.3
14	2019/01/08 08:29:00	44.2
15	2019/01/08 08:29:01	44.5
16	2019/01/08 08:29:02	43.6
17	2019/01/08 08:29:03	42.8
18	2019/01/08 08:29:04	44.7
19	2019/01/08 08:29:05	43.3
20	2019/01/08 08:29:06	43.7
21	2019/01/08 08:29:07	44.0
22	2019/01/08 08:29:08	45.6
23	2019/01/08 08:29:09	45.2
24	2019/01/08 08:29:10	43.8
25	2019/01/08 08:29:11	45.0
26	2019/01/08 08:29:12	45.5
27	2019/01/08 08:29:13	44.1
28	2019/01/08 08:29:14	44.1
29	2019/01/08 08:29:15	44.6
30	2019/01/08 08:29:16	44.7
31	2019/01/08 08:29:17	44.5
32	2019/01/08 08:29:18	44.3
33	2019/01/08 08:29:19	43.8
34	2019/01/08 08:29:20	43.5
35	2019/01/08 08:29:21	44.1
36	2019/01/08 08:29:22	44.6
37	2019/01/08 08:29:23	44.6
38	2019/01/08 08:29:24	45.2
39	2019/01/08 08:29:25	45.0
40	2019/01/08 08:29:26	44.8
41	2019/01/08 08:29:27	45.2
42	2019/01/08 08:29:28	45.2
43	2019/01/08 08:29:29	45.1
44	2019/01/08 08:29:30	45.3
45	2019/01/08 08:29:31	44.2
46	2019/01/08 08:29:32	44.2
47	2019/01/08 08:29:33	44.8
48	2019/01/08 08:29:34	44.4
49	2019/01/08 08:29:35	44.2
50	2019/01/08 08:29:36	45.2
51	2019/01/08 08:29:37	44.1
52	2019/01/08 08:29:38	45.2
53	2019/01/08 08:29:39	45.3
54	2019/01/08 08:29:40	45.1
55	2019/01/08 08:29:41	44.6
56	2019/01/08 08:29:42	44.7
57	2019/01/08 08:29:43	44.4
58	2019/01/08 08:29:44	43.9
59	2019/01/08 08:29:45	44.7
60	2019/01/08 08:29:46	44.5
61	2019/01/08 08:29:47	45.0
62	2019/01/08 08:29:48	43.7
63	2019/01/08 08:29:49	43.8
64	2019/01/08 08:29:50	45.8
65	2019/01/08 08:29:51	43.9
66	2019/01/08 08:29:52	43.8
67	2019/01/08 08:29:53	44.3
68	2019/01/08 08:29:54	45.3
69	2019/01/08 08:29:55	44.6
70	2019/01/08 08:29:56	44.6
71	2019/01/08 08:29:57	44.5
72	2019/01/08 08:29:58	44.5
73	2019/01/08 08:29:59	45.7
74	2019/01/08 08:30:00	47.5
75	2019/01/08 08:30:01	45.2
76	2019/01/08 08:30:02	44.2
77	2019/01/08 08:30:03	44.3
78	2019/01/08 08:30:04	43.7
79	2019/01/08 08:30:05	44.7
80	2019/01/08 08:30:06	45.5
81	2019/01/08 08:30:07	43.1
82	2019/01/08 08:30:08	44.1
83	2019/01/08 08:30:09	43.4
84	2019/01/08 08:30:10	43.5
85	2019/01/08 08:30:11	44.2

Reference Noise Level	75
Reference Distance	140
Site Conditions	Soft

Distance from Barrier to Source	Distance from Barrier to Receiver	Distance from Source to Receiver	Height of Source	Height of Wall	Height of Receiver	Noise Level Reduction	Unabated Noise Level	Resultant Noise Level
130	10	140	10	12	5	16	75	59
120	20	140	10	12	5	13	75	62
110	30	140	10	12	5	12	75	63
100	40	140	10	12	5	10	75	65
90	50	140	10	12	5	10	75	65

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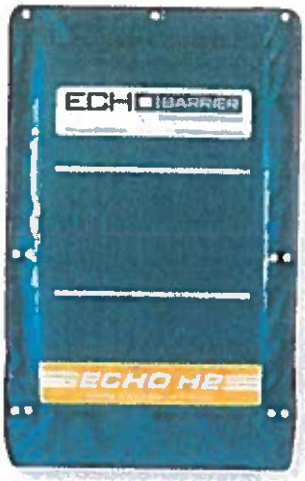
Visit our Website: www.acousticalsurfaces.com

We Identify and S.T.O.P. Your Noise Problems



Echo Barrier™

The Industry's First Reusable, Indoor/ Outdoor Noise Barrier/Absorber

- Superior acoustic performance
- Industrial durability
- Simple and quick installation system
- Lightweight for easy handling
- Unique roll-up design for compact storage and transportation
- Double or triple up for noise 'hot spots'
- Ability to add branding or messages
- Range of accessories available
- Weatherproof – absorbs sound but not water
- Fire retardant
- 1 person can do the job of 2 or 3 people

Why is it all too often we see construction sites with fencing but no regard for sound issues created from the construction that is taking place? This is due to the fact that there has not been an efficient means of treating this type of noise that was cost effective ***until now.***

Echo Barrier temporary fencing is a reusable, outdoor noise barrier. Designed to fit on all types of temporary fencing. Echo Barrier absorbs sound while remaining quick to install, light to carry and tough to last.

BENEFITS: Echo Barrier can help reduce noise complaints, enhance your company reputation, extend site operating hours, reduce project timescales & costs, and improve working conditions.

APPLICATIONS: Echo Barrier works great for construction & demolition sites; rail maintenance & replacement; music, sports and other public events; road construction; utility/maintenance sites; loading and unloading areas; outdoor gun ranges.

DIMENSIONS: 6.56' x 4.49'.

WEIGHT: 13 lbs.

ACOUSTIC PERFORMANCE: 10-20dB noise reduction (greater if barrier is doubled up).

INSTALLATION: The Echo Barrier is easily installed using our quick hook system and specially designed elastic ties.

Echo Barrier Transmission Loss Field Data							
	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
Single Layer	6	12	16	23	28	30	30
Double Layer	7	19	24	28	32	31	32

Appendix D

Construction Noise Specifications

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/14/2019
Case Description: 6911 Hill Side Construction - Unabated

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Res	Residential	50.0	50.0	40.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40		81.7	140.0	0.0
Grader	No	40	85.0		140.0	0.0
Front End Loader	No	40		79.1	140.0	0.0
Compressor (air)	No	40		77.7	140.0	0.0
Compressor (air)	No	40		77.7	140.0	0.0

Results

Equipment	Calculated (dBA) Lmax	Leq	Noise Limits (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Noise Limit Exceedance (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	72.7	68.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grader	76.1	72.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	70.2	66.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compressor (air)	68.7	64.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	76.1	75.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Appendix C

Roadway Construction Noise Model Worksheets