RAMBOLL

ENVIRONMENT
& HEALTH

MEMO

Date	**May 25, 2018**
To	**Brian Sarantos** **Development Manager, West Region, EDF Renewables**
From	**Kevin Warner**
Subject	**Response to EFSEC Comments: Desert Claim Noise Study**

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INTRODUCTION

Ramboll US Corporation (Ramboll) prepared an Environmental Noise Assessment Technical Report for the revised Desert Claim Wind Project ("Desert Claim", or the "project"). The project is a proposed 25 – 31 turbine wind project centered approximately 9 miles north of Ellensburg, in Kittitas County, Washington.

Ramboll's noise analysis represented an update to the previously submitted noise study prepared in 2008 by DNV Global Energy Concepts, Inc. (GEC 2008). Washington State's Energy Facility Site Evaluation Council (EFSEC), the reviewing authority for large energy facilities that are constructed in Washington, reviewed the 2008 study and concluded that the project would comply with state noise regulations.

Results of Ramboll's recent updated noise analysis were evaluated for compliance with applicable sound level limits, and were compared with the 2008 GEC study. Ramboll's noise compliance and impact assessment concluded that the revised project would continue to comply with applicable sound level limits and Site Certificate Agreement conditions. The noise impacts of the revised project would be less than or equal to those for the original project approved by EFSEC.

EFSEC has reviewed the Ramboll noise study and requested additional information of, or response from, Ramboll. Some of the information request items have been address by others, and the following items are addressed in this memorandum:

1. A summary of ambient (background) sound levels, project-only sound levels, and ambient plus project levels, at all modeled receptor locations.

2. A description of sound weighting systems including C-weighting (dBC) and G-weighting (dBG), compared with what was used in the noise study (i.e., A-weighing (dBA)).

3. An explanation of Low Frequency Noise (LFN) and justification for not including assessment of LFN in this noise report.

1. SUMMARY OF SOUND LEVELS: AMBIENT AND WITH PROJECT

Ambient Sound Level Summary

Ramboll completed ambient sound level measurements at four (4) locations in the vicinity of project site. Measurements were made between March 16 and March 21, 2016, and represent existing sound levels at different locations within the project vicinity. Three measurement locations were near existing residential areas, and one was far from the nearest residential area, but generally representative of existing levels at the residential area nearest the project area. An illustration of the sound level measurement locations is provided in **Figure 1**.

A summary of the average hourly nighttime sound level data at each location is provided in **Table 1** for various groupings of wind speeds. Note that as wind speeds increase, ambient sound levels increase due mostly to rustling of vegetation such as grasses, trees, and shrubs.

Table 1. Ambient Sound Level Measurement Data Summary

Measurement ID#	Nighttime Sound Levels By Wind Speed Grouping		
	4 m/s (0-4 m/s)	8 m/s (5-9 m/s)	10 m/s (>9 m/s)
SLM1	32.9	35.5	48.3
SLM2	29.8	35.7	42.6
SLM3	29.1	44.6	51.2
SLM4	34.0	42.0	50.8
Source: Ramboll			

Summary of Project Sound Levels and Increases Over Ambient

As summarized in the noise report, Ramboll computed project-only sound levels, by turbine option, at various wind speeds (4 m/s, 8 m/s, and 10 m/s), at all residential receptors within the project vicinity. Table 4 of the noise report provided a summary of the highest predicted project-only sound levels at residential receptors for each turbine model option (Vestas and Siemens) under each wind speed. Sound level data were reported for direct comparison with applicable WAC limits.

Included in Attachment A of this memorandum is a full tabular summary of the results of sound level calculations at all receptor locations (not just the highest value) for both Vestas and Siemens options, at various wind speeds. Included are both residential and non-residential properties (identified as agriculture/silviculture land uses). The summary tables also include an estimate of ambient sound levels at each receptor location (based on the most representative sound level measurement location) using ambient data by wind speed groupings (see above **Table 1**), a calculation of ambient plus project levels, and the resulting increase of ambient plus project over ambient, if applicable.

At most receptors and under most wind conditions, the modelling predicts that sound levels may increase by 0-3 dBA when the turbines are operating. There a few residential receptors where sound levels are predicted to increase by as much as 4-8 dBA under certain wind conditions, and there are some non-residential, agricultural areas where predicted increases are 8-10 dBA under certain conditions.

In considering these modelling results, it is important to note the following:

1. In a typical outdoor environment where ambient sounds fluctuate over the course of an hour and day due to weather conditions and other miscellaneous noises, most people cannot detect small changes in ambient sound levels. Changes in ambient sound levels of 5 dBA or greater, in typical outdoor environments, maybe noticeable.

2. The ambient sound levels at many of the receptors evaluated was very low. As a result, a receiving location may remain quiet even with a noticeable increase in sound levels. For example, an 8-dBA increase from 35 dBA to 43 dBA may be detectable by the human ear, but most people would consider sound levels of 43 dBA to be quiet. Washington State's nighttime noise limit for Class A (residential) receiving locations affected by a Class C sound source (e.g., a wind turbine project) is 50 dBA, plus allowed short-term exceedance of these limits. To put the overall sound levels into perspective, the following table reflects some typical sound levels

30 dBA	Soft Whisper
40 dBA	Quiet Library or Light Rain
50 dBA	Quiet Urban Daytime or Quiet Office
60 dBA	Ordinary Conversation
70 dBA	A Busy Street

3. The noise predictions for Desert Claim assume continuous exposure over hourly time periods, and with an assumed wind direction from each turbine toward each receiver. The sound levels presented in the report are therefore conservative, and in reality, would not occur for extended time periods, as wind speeds and directions change.

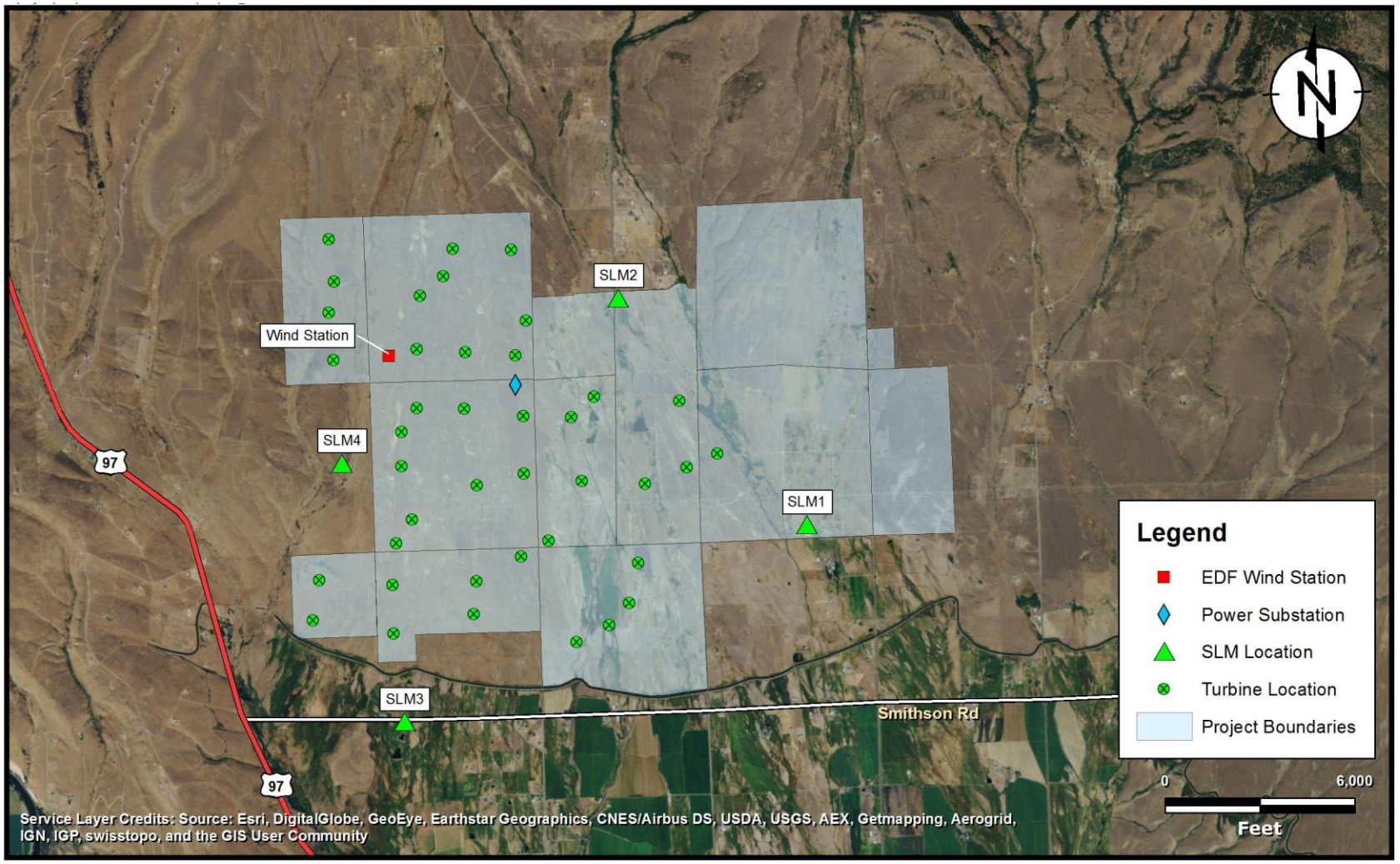

Figure 1. Sound Level Measurement Locations

2. DEFINITION OF COMMON SOUND WEIGHTING SYSTEMS

The human ear responds to a very wide range of sound intensities. The decibel scale (dB) used to describe sound is a logarithmic rating system which accounts for the large differences in audible sound intensities.

The frequency range of human hearing is defined as between 20 hertz (Hz) and 20,000 Hz. Various filters can be applied to "weight" or reduce sound frequencies within this range. The A-weighting filter is commonly applied in environmental noise evaluations, and is described as most representative of the way humans hear sound. Applying an A-weighted filter on a recorded sound reduces noise levels in the low frequency range, and to a lesser degree, the higher frequency range because people cannot hear well very low frequency sounds or very high frequency sounds. For this reason, Washington State, and most other jurisdictions, use A-weighted decibels or dBA in noise regulations.

C-weighting, or dBC, applies less of a reduction on low and high frequencies, and can be used to document or analyze peak sounds at very high levels (i.e., above 100 dB), because the human ear's response to extremely loud sound is much flatter across the frequency spectrum than for quieter sounds. Evaluation of noise using C-weighted data may be suitable where a source sound level is relatively high, and when it may have elevated levels in the low frequency range. For Desert Claim, and for all wind projects that Ramboll has worked on, it is not applicable because predicted sound levels from the project are typically very low (in dBA). Ramboll experience with assessment of measured dBA versus dBC levels for wind turbines has generally shown up to about a 10-dB difference between measured values, much lower than the commonly accepted 20-dB difference that is used to determine whether a noise source contains a substantial low-frequency noise component. Further, field and measurement experience by Ramboll staff, including sleeping very near an active turbine to observe overnight noise emissions, has suggested no substantial low frequency noise component from turbine noise. Washington's regulations do not use C-weighting.

G-weighting is rarely used in the assessment of environmental noise. It is used in specialized applications when there is a known concern about high levels of sound in the infrasound range (below 20 Hz). Wind projects are not known to result in perceptible levels of infrasound at nearby residences, and G-weighted evaluations are generally not performed for wind projects. Washington's regulations do not use G-weighting.

3. LOW FREQUENCY NOISE

Low Frequency Noise, or LFN, is noise in the lower frequency range of the audible sound spectrum, commonly defined as between about 20 Hz and 200 Hz. LFN may or may not be audible by a listener, and may or may not be "felt". High levels of LFN can be attributed to sleep interference, increased stress, and other health effects. However, various factors may affect perception including age of the person hearing the noise, interfering noises and/or vibrations, sensitivity to LFN noises, and others.

LFN was not evaluated for this project because it was not anticipated to be of concern. As indicated above, Ramboll's experience evaluating LFN through comparison of measured dBA versus dBC has

suggested up to about a 10-dB difference, which is far below the 20-dB threshold commonly accepted as indicative of a source that contains a LFN component. That is, noise measurements of newly constructed wind projects, with turbines similar to those proposed for the project, did not result in high levels of LFN, and Ramboll field staff have not observed perceptible levels of LFN at any measurement location.

Attachment A

Sound Level Measurement Summary Data

Table 1. Vestas Option: Sound Level Results By Receptor, Including Increase over Ambient Conditions

Receptor		Vestas 4 m/s				Vestas 8 m/s				Vestas 10 m/s			
ID [a]	Use [b]	Ambient (0-4 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (5-9 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (>9 m/s)	Project	Ambient + Project	Increase Over Ambient
R01	Residential	29.8	18.3	30.1	0.3	35.7	28.1	36.4	0.7	42.6	28.9	42.7	0.2
R02	Residential	29.8	26.6	31.5	1.7	35.7	36.3	39.0	3.3	42.6	37.3	43.7	1.1
R03	Residential	32.9	27.2	33.9	1.0	35.5	38.0	39.9	4.4	48.3	38.9	48.8	0.5
R04	Residential	29.8	17.2	30.0	0.2	35.7	26.0	36.1	0.4	42.6	26.9	42.7	0.1
R05	Residential	29.8	27.3	31.7	1.9	35.7	37.1	39.5	3.8	42.6	38.1	43.9	1.3
R06	Residential	32.9	28.5	34.2	1.3	35.5	39.3	40.8	5.3	48.3	40.2	48.9	0.6
R07	Residential	29.8	14.5	29.9	0.1	35.7	22.7	35.9	0.2	42.6	23.5	42.6	0.1
R08	Residential	29.8	12.4	29.9	0.1	35.7	22.3	35.9	0.2	42.6	23.1	42.6	0.0
R09	Residential	29.8	16.6	30.0	0.2	35.7	25.3	36.1	0.4	42.6	26.2	42.7	0.1
R10	Residential	29.8	28.1	32.0	2.2	35.7	38.5	40.3	4.6	42.6	39.5	44.3	1.7
R11	Residential	29.8	24.8	31.0	1.2	35.7	35.1	38.4	2.7	42.6	36.1	43.4	0.9
R12	Residential	29.1	21.7	29.8	0.7	44.6	32.2	44.8	0.2	51.2	33.0	51.3	0.1
R13	Residential	29.1	21.3	29.7	0.7	44.6	31.6	44.8	0.2	51.2	32.5	51.3	0.1
R14	Residential	29.1	21.3	29.7	0.7	44.6	31.6	44.8	0.2	51.2	32.5	51.3	0.1
R15	Residential	29.1	22.6	30.0	0.9	44.6	32.9	44.9	0.3	51.2	33.7	51.3	0.1
R16	Residential	32.9	20.0	33.1	0.2	35.5	29.8	36.5	1.0	48.3	30.7	48.4	0.1
R17	Residential	32.9	12.9	32.9	0.0	35.5	23.1	35.7	0.2	48.3	23.9	48.3	0.0
R18	Residential	32.9	8.3	32.9	0.0	35.5	18.6	35.6	0.1	48.3	19.3	48.3	0.0
R19	Residential	32.9	9.6	32.9	0.0	35.5	20.2	35.6	0.1	48.3	21.0	48.3	0.0
R20	Residential	32.9	9.9	32.9	0.0	35.5	19.6	35.6	0.1	48.3	20.4	48.3	0.0
R21	Residential	29.1	25.5	30.7	1.6	44.6	36.1	45.2	0.6	51.2	37.0	51.4	0.2
R22	Residential	29.8	24.0	30.8	1.0	35.7	34.2	38.0	2.3	42.6	35.2	43.3	0.7
R23	Residential	29.8	24.4	30.9	1.1	35.7	34.7	38.2	2.5	42.6	35.6	43.4	0.8
R24	Residential	29.8	26.8	31.6	1.8	35.7	37.4	39.6	4.0	42.6	38.3	43.9	1.4
R25	Residential	29.8	26.6	31.5	1.7	35.7	36.3	39.0	3.3	42.6	37.3	43.7	1.1
R26	Residential	32.9	25.3	33.6	0.7	35.5	35.9	38.7	3.2	48.3	36.8	48.6	0.3
R27	Residential	29.1	22.9	30.0	0.9	44.6	33.3	44.9	0.3	51.2	34.1	51.3	0.1
R28	Residential	32.9	25.8	33.7	0.8	35.5	36.5	39.0	3.5	48.3	37.4	48.6	0.3
R29	Residential	29.1	23.7	30.2	1.1	44.6	34.3	45.0	0.4	51.2	35.2	51.3	0.1
R30	Residential	29.1	23.7	30.2	1.1	44.6	34.3	45.0	0.4	51.2	35.2	51.3	0.1
R31	Residential	29.1	23.9	30.2	1.2	44.6	34.3	45.0	0.4	51.2	35.2	51.3	0.1
R32	Residential	29.1	23.9	30.2	1.2	44.6	34.4	45.0	0.4	51.2	35.2	51.3	0.1
R33	Residential	34.0	24.5	34.5	0.5	42.0	35.5	42.9	0.9	50.8	36.4	50.9	0.2
R34	Residential	34.0	24.7	34.5	0.5	42.0	35.8	42.9	0.9	50.8	36.7	50.9	0.2
R35	Residential	34.0	23.5	34.4	0.4	42.0	34.3	42.7	0.7	50.8	35.2	50.9	0.1
R36	Residential	34.0	23.4	34.4	0.4	42.0	34.4	42.7	0.7	50.8	35.3	50.9	0.1
R37	Residential	34.0	20.3	34.2	0.2	42.0	31.2	42.3	0.3	50.8	32.0	50.8	0.1
R38	Residential	29.1	24.1	30.3	1.2	44.6	34.4	45.0	0.4	51.2	35.3	51.3	0.1
R39	Residential	34.0	27.1	34.8	0.8	42.0	38.2	43.5	1.5	50.8	39.1	51.1	0.3
R40	Residential	34.0	25.4	34.6	0.6	42.0	35.6	42.9	0.9	50.8	36.5	50.9	0.2
R41	Residential	32.9	20.6	33.1	0.2	35.5	30.6	36.7	1.2	48.3	31.4	48.4	0.1
R42	Residential	34.0	24.8	34.5	0.5	42.0	35.7	42.9	0.9	50.8	36.6	50.9	0.2
R43	Residential	34.0	15.2	34.1	0.1	42.0	25.3	42.1	0.1	50.8	26.2	50.8	0.0
R44	Residential	34.0	16.8	34.1	0.1	42.0	27.3	42.1	0.1	50.8	28.1	50.8	0.0
R45	Residential	34.0	20.8	34.2	0.2	42.0	31.8	42.4	0.4	50.8	32.7	50.8	0.1
R46	Residential	34.0	18.2	34.1	0.1	42.0	28.8	42.2	0.2	50.8	29.7	50.8	0.0
R47	Residential	34.0	26.5	34.7	0.7	42.0	37.7	43.4	1.4	50.8	38.6	51.0	0.3
R48	Residential	32.9	22.1	33.2	0.3	35.5	32.6	37.3	1.8	48.3	33.4	48.4	0.1
R49	Residential	29.1	24.4	30.3	1.3	44.6	34.9	45.0	0.4	51.2	35.7	51.3	0.1
R50	Residential	29.1	25.5	30.7	1.6	44.6	36.2	45.2	0.6	51.2	37.1	51.4	0.2
R51	Residential	29.1	25.3	30.6	1.5	44.6	36.1	45.2	0.6	51.2	37.0	51.4	0.2
R52	Residential	32.9	22.4	33.3	0.4	35.5	32.8	37.4	1.9	48.3	33.7	48.5	0.1
R53	Residential	32.9	25.2	33.6	0.7	35.5	35.8	38.7	3.2	48.3	36.7	48.6	0.3
R54	Residential	29.8	27.2	31.7	1.9	35.7	38.1	40.1	4.4	42.6	39.0	44.1	1.6
R55	Residential	29.8	25.5	31.2	1.4	35.7	36.1	38.9	3.2	42.6	36.9	43.6	1.0
R56	Residential	29.8	26.8	31.6	1.8	35.7	37.3	39.6	3.9	42.6	38.2	43.9	1.4

Receptor		Vestas 4 m/s				Vestas 8 m/s				Vestas 10 m/s			
ID [a]	Use [b]	Ambient (0-4 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (5-9 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (>9 m/s)	Project	Ambient + Project	Increase Over Ambient
R57	Residential	29.8	26.5	31.5	1.7	35.7	37.0	39.4	3.7	42.6	37.9	43.8	1.3
R58	Residential	29.8	25.3	31.1	1.3	35.7	35.7	38.7	3.0	42.6	36.5	43.5	1.0
R59	Residential	29.8	24.7	31.0	1.2	35.7	35.1	38.4	2.7	42.6	36.0	43.4	0.9
R60	Residential	29.8	24.7	31.0	1.2	35.7	35.1	38.4	2.7	42.6	35.9	43.4	0.8
R61	Residential	29.8	24.8	31.0	1.2	35.7	35.2	38.5	2.8	42.6	36.0	43.4	0.9
R62	Residential	29.8	24.3	30.9	1.1	35.7	34.7	38.2	2.5	42.6	35.6	43.4	0.8
R63	Residential	29.8	24.4	30.9	1.1	35.7	34.3	38.1	2.4	42.6	35.1	43.3	0.7
R64	Residential	29.8	23.6	30.7	0.9	35.7	33.5	37.7	2.1	42.6	34.3	43.2	0.6
R65	Residential	29.8	18.6	30.1	0.3	35.7	28.0	36.4	0.7	42.6	28.8	42.7	0.2
R66	Residential	29.8	26.3	31.4	1.6	35.7	36.7	39.2	3.5	42.6	37.6	43.8	1.2
R67	Residential	29.8	23.8	30.8	1.0	35.7	34.5	38.1	2.5	42.6	35.3	43.3	0.7
R68	Residential	29.8	22.9	30.6	0.8	35.7	33.5	37.7	2.1	42.6	34.3	43.2	0.6
R69	Residential	29.8	10.7	29.9	0.1	35.7	20.9	35.8	0.1	42.6	21.7	42.6	0.0
R70	Residential	29.8	13.6	29.9	0.1	35.7	23.6	35.9	0.3	42.6	24.4	42.6	0.1
R71	Residential	29.8	15.1	29.9	0.1	35.7	24.2	36.0	0.3	42.6	24.9	42.6	0.1
R72	Residential	29.8	13.5	29.9	0.1	35.7	23.7	35.9	0.3	42.6	24.5	42.6	0.1
R73	Residential	29.8	15.9	30.0	0.2	35.7	25.1	36.0	0.4	42.6	25.8	42.7	0.1
R74	Residential	29.8	10.9	29.9	0.1	35.7	21.2	35.8	0.2	42.6	22.0	42.6	0.0
R75	Residential	29.8	16.3	30.0	0.2	35.7	25.5	36.1	0.4	42.6	26.2	42.7	0.1
R76	Residential	29.8	13.9	29.9	0.1	35.7	24.1	36.0	0.3	42.6	24.8	42.6	0.1
R77	Residential	29.8	13.3	29.9	0.1	35.7	23.5	35.9	0.3	42.6	24.3	42.6	0.1
R78	Residential	29.1	25.3	30.6	1.5	44.6	35.9	45.1	0.6	51.2	36.8	51.4	0.2
R79	Residential	29.1	25.1	30.5	1.5	44.6	36.0	45.1	0.6	51.2	36.8	51.4	0.2
R80	Residential	29.1	24.2	30.3	1.2	44.6	35.2	45.0	0.5	51.2	36.1	51.4	0.1
R81	Residential	29.1	22.8	30.0	0.9	44.6	33.6	44.9	0.3	51.2	34.4	51.3	0.1
R82	Residential	29.1	23.3	30.1	1.0	44.6	34.2	45.0	0.4	51.2	35.1	51.3	0.1
R83	Residential	29.1	23.9	30.2	1.2	44.6	34.9	45.0	0.4	51.2	35.7	51.3	0.1
R84	Residential	32.9	11.2	32.9	0.0	35.5	20.9	35.6	0.1	48.3	21.7	48.3	0.0
R85	Residential	32.9	22.0	33.2	0.3	35.5	32.1	37.1	1.6	48.3	33.0	48.4	0.1
R86	Residential	32.9	22.0	33.2	0.3	35.5	32.1	37.1	1.6	48.3	32.9	48.4	0.1
R87	Residential	32.9	9.0	32.9	0.0	35.5	19.2	35.6	0.1	48.3	20.0	48.3	0.0
R88	Residential	32.9	13.3	32.9	0.0	35.5	23.4	35.8	0.3	48.3	24.2	48.3	0.0
R89	Agriculture/Silviculture	34.0	28.5	35.1	1.1	42.0	39.7	44.0	2.0	50.8	40.6	51.2	0.4
R90	Agriculture/Silviculture	34.0	32.3	36.2	2.2	42.0	43.9	46.1	4.1	50.8	44.8	51.8	1.0
R91	Agriculture/Silviculture	34.0	33.1	36.6	2.6	42.0	44.5	46.4	4.4	50.8	45.4	51.9	1.1
R92	Agriculture/Silviculture	34.0	33.7	36.9	2.9	42.0	45.2	46.9	4.9	50.8	46.1	52.1	1.3
R93	Agriculture/Silviculture	29.1	33.8	35.1	6.0	44.6	45.5	48.1	3.5	51.2	46.4	52.5	1.2
R94	Agriculture/Silviculture	29.1	30.7	33.0	3.9	44.6	42.1	46.5	1.9	51.2	43.0	51.8	0.6
R95	Agriculture/Silviculture	29.1	29.8	32.5	3.4	44.6	41.0	46.2	1.6	51.2	41.9	51.7	0.5
R96	Agriculture/Silviculture	29.1	27.1	31.2	2.1	44.6	38.2	45.5	0.9	51.2	39.2	51.5	0.3
R97	Agriculture/Silviculture	32.9	28.3	34.2	1.3	35.5	39.2	40.7	5.2	48.3	40.2	48.9	0.6
R98	Agriculture/Silviculture	29.8	34.6	35.8	6.0	35.7	45.6	46.0	10.3	42.6	46.5	48.0	5.4

Table 2. Siemens Option: Sound Level Results By Receptor, Including Increase over Ambient Conditions

Receptor		Siemens 4 m/s				Siemens 8 m/s				Siemens 10 m/s			
ID [a]	Use [b]	Ambient (0-4 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (5-9 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (>9 m/s)	Project	Ambient + Project	Increase Over Ambient
R01	Residential	29.8	21.2	30.4	0.6	35.7	32.1	37.3	1.6	42.6	35.4	43.3	0.8
R02	Residential	29.8	27.6	31.8	2.0	35.7	38.2	40.1	4.4	42.6	41.6	45.1	2.6
R03	Residential	32.9	29.6	34.6	1.7	35.5	40.5	41.7	6.2	48.3	43.7	49.6	1.3
R04	Residential	29.8	19.5	30.2	0.4	35.7	29.9	36.7	1.0	42.6	33.2	43.0	0.5
R05	Residential	29.8	28.4	32.2	2.4	35.7	38.9	40.6	4.9	42.6	42.3	45.4	2.9
R06	Residential	32.9	30.8	35.0	2.1	35.5	41.7	42.6	7.1	48.3	44.9	49.9	1.6
R07	Residential	29.8	16.0	30.0	0.2	35.7	26.0	36.1	0.4	42.6	29.3	42.8	0.2
R08	Residential	29.8	14.7	29.9	0.1	35.7	25.5	36.1	0.4	42.6	28.8	42.7	0.2
R09	Residential	29.8	18.9	30.1	0.3	35.7	29.3	36.6	0.9	42.6	32.6	43.0	0.4
R10	Residential	29.8	28.7	32.3	2.5	35.7	39.8	41.2	5.5	42.6	43.3	46.0	3.4
R11	Residential	29.8	26.4	31.4	1.6	35.7	37.4	39.6	4.0	42.6	40.8	44.8	2.2
R12	Residential	29.1	25.3	30.6	1.5	44.6	36.2	45.2	0.6	51.2	39.4	51.5	0.3
R13	Residential	29.1	24.8	30.5	1.4	44.6	35.7	45.1	0.5	51.2	38.9	51.5	0.2
R14	Residential	29.1	24.8	30.5	1.4	44.6	35.7	45.1	0.5	51.2	38.9	51.5	0.2
R15	Residential	29.1	25.4	30.6	1.5	44.6	36.2	45.2	0.6	51.2	39.4	51.5	0.3
R16	Residential	32.9	22.3	33.3	0.4	35.5	33.0	37.4	1.9	48.3	36.3	48.6	0.3
R17	Residential	32.9	16.7	33.0	0.1	35.5	27.7	36.2	0.7	48.3	30.9	48.4	0.1
R18	Residential	32.9	10.4	32.9	0.0	35.5	21.5	35.7	0.2	48.3	24.9	48.3	0.0
R19	Residential	32.9	11.7	32.9	0.0	35.5	22.7	35.7	0.2	48.3	26.1	48.3	0.0
R20	Residential	32.9	11.5	32.9	0.0	35.5	22.2	35.7	0.2	48.3	25.6	48.3	0.0
R21	Residential	29.1	28.9	32.0	2.9	44.6	39.7	45.8	1.2	51.2	42.9	51.8	0.6
R22	Residential	29.8	25.8	31.3	1.5	35.7	36.8	39.3	3.6	42.6	40.2	44.6	2.0
R23	Residential	29.8	26.0	31.3	1.5	35.7	37.0	39.4	3.7	42.6	40.4	44.6	2.1
R24	Residential	29.8	28.4	32.2	2.4	35.7	39.4	40.9	5.3	42.6	42.8	45.7	3.1
R25	Residential	29.8	27.9	32.0	2.2	35.7	38.4	40.3	4.6	42.6	41.8	45.2	2.6
R26	Residential	32.9	27.9	34.1	1.2	35.5	38.8	40.5	5.0	48.3	42.0	49.2	0.9
R27	Residential	29.1	25.7	30.7	1.6	44.6	36.5	45.2	0.6	51.2	39.8	51.5	0.3
R28	Residential	32.9	28.4	34.2	1.3	35.5	39.2	40.7	5.2	48.3	42.5	49.3	1.0
R29	Residential	29.1	27.3	31.3	2.2	44.6	38.2	45.5	0.9	51.2	41.4	51.7	0.4
R30	Residential	29.1	27.3	31.3	2.2	44.6	38.2	45.5	0.9	51.2	41.4	51.7	0.4
R31	Residential	29.1	27.5	31.4	2.3	44.6	38.3	45.5	0.9	51.2	41.4	51.7	0.4
R32	Residential	29.1	27.5	31.4	2.3	44.6	38.3	45.5	0.9	51.2	41.4	51.7	0.4
R33	Residential	34.0	28.2	35.0	1.0	42.0	39.1	43.8	1.8	50.8	42.2	51.3	0.6
R34	Residential	34.0	28.4	35.1	1.1	42.0	39.3	43.9	1.9	50.8	42.4	51.4	0.6
R35	Residential	34.0	27.6	34.9	0.9	42.0	38.5	43.6	1.6	50.8	41.7	51.3	0.5
R36	Residential	34.0	27.5	34.9	0.9	42.0	38.4	43.6	1.6	50.8	41.5	51.3	0.5
R37	Residential	34.0	24.6	34.5	0.5	42.0	35.4	42.9	0.9	50.8	38.6	51.0	0.3
R38	Residential	29.1	27.7	31.5	2.4	44.6	38.5	45.5	1.0	51.2	41.6	51.7	0.4
R39	Residential	34.0	30.4	35.6	1.6	42.0	41.3	44.7	2.7	50.8	44.5	51.7	0.9
R40	Residential	34.0	28.6	35.1	1.1	42.0	39.2	43.8	1.8	50.8	42.4	51.4	0.6
R41	Residential	32.9	23.0	33.3	0.4	35.5	33.7	37.7	2.2	48.3	37.0	48.6	0.3
R42	Residential	34.0	28.7	35.1	1.1	42.0	39.6	44.0	2.0	50.8	42.8	51.4	0.6
R43	Residential	34.0	18.6	34.1	0.1	42.0	29.5	42.2	0.2	50.8	32.6	50.8	0.1
R44	Residential	34.0	20.9	34.2	0.2	42.0	31.7	42.4	0.4	50.8	34.9	50.9	0.1
R45	Residential	34.0	25.0	34.5	0.5	42.0	35.9	43.0	1.0	50.8	39.0	51.1	0.3
R46	Residential	34.0	21.8	34.3	0.3	42.0	32.6	42.5	0.5	50.8	35.8	50.9	0.1
R47	Residential	34.0	30.1	35.5	1.5	42.0	41.0	44.5	2.5	50.8	44.1	51.6	0.8
R48	Residential	32.9	24.7	33.5	0.6	35.5	35.7	38.6	3.1	48.3	39.0	48.8	0.5
R49	Residential	29.1	27.9	31.5	2.5	44.6	38.7	45.6	1.0	51.2	41.8	51.7	0.5
R50	Residential	29.1	28.9	32.0	2.9	44.6	39.8	45.8	1.2	51.2	43.0	51.8	0.6
R51	Residential	29.1	28.7	31.9	2.8	44.6	39.6	45.8	1.2	51.2	42.7	51.8	0.6
R52	Residential	32.9	25.5	33.6	0.7	35.5	36.5	39.0	3.5	48.3	39.7	48.9	0.6
R53	Residential	32.9	27.9	34.1	1.2	35.5	38.7	40.4	4.9	48.3	42.0	49.2	0.9
R54	Residential	29.8	29.7	32.8	3.0	35.7	40.6	41.8	6.1	42.6	43.8	46.2	3.7
R55	Residential	29.8	27.5	31.8	2.0	35.7	38.4	40.3	4.6	42.6	41.8	45.2	2.6
R56	Residential	29.8	28.2	32.1	2.3	35.7	39.1	40.7	5.0	42.6	42.5	45.5	3.0

Receptor		Siemens 4 m/s				Siemens 8 m/s				Siemens 10 m/s			
ID [a]	Use [b]	Ambient (0-4 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (5-9 m/s)	Project	Ambient + Project	Increase Over Ambient	Ambient (>9 m/s)	Project	Ambient + Project	Increase Over Ambient
R57	Residential	29.8	27.8	31.9	2.1	35.7	38.8	40.5	4.8	42.6	42.2	45.4	2.8
R58	Residential	29.8	26.8	31.6	1.8	35.7	37.8	39.9	4.2	42.6	41.2	44.9	2.4
R59	Residential	29.8	26.6	31.5	1.7	35.7	37.5	39.7	4.0	42.6	40.8	44.8	2.2
R60	Residential	29.8	26.5	31.5	1.7	35.7	37.4	39.6	4.0	42.6	40.8	44.8	2.2
R61	Residential	29.8	26.5	31.5	1.7	35.7	37.5	39.7	4.0	42.6	40.8	44.8	2.2
R62	Residential	29.8	26.3	31.4	1.6	35.7	37.2	39.5	3.8	42.6	40.6	44.7	2.1
R63	Residential	29.8	26.3	31.4	1.6	35.7	36.9	39.3	3.7	42.6	40.2	44.6	2.0
R64	Residential	29.8	25.7	31.2	1.4	35.7	36.3	39.0	3.3	42.6	39.6	44.3	1.8
R65	Residential	29.8	20.4	30.3	0.5	35.7	30.9	36.9	1.2	42.6	34.3	43.2	0.6
R66	Residential	29.8	27.3	31.7	1.9	35.7	38.3	40.2	4.5	42.6	41.8	45.2	2.6
R67	Residential	29.8	26.6	31.5	1.7	35.7	37.5	39.7	4.0	42.6	40.8	44.8	2.2
R68	Residential	29.8	26.1	31.3	1.5	35.7	37.0	39.4	3.7	42.6	40.2	44.6	2.0
R69	Residential	29.8	12.7	29.9	0.1	35.7	23.8	36.0	0.3	42.6	27.3	42.7	0.1
R70	Residential	29.8	14.8	29.9	0.1	35.7	25.8	36.1	0.4	42.6	29.3	42.8	0.2
R71	Residential	29.8	16.4	30.0	0.2	35.7	26.7	36.2	0.5	42.6	30.1	42.8	0.2
R72	Residential	29.8	15.1	29.9	0.1	35.7	26.3	36.2	0.5	42.6	29.8	42.8	0.2
R73	Residential	29.8	17.7	30.1	0.3	35.7	28.1	36.4	0.7	42.6	31.5	42.9	0.3
R74	Residential	29.8	14.0	29.9	0.1	35.7	25.1	36.0	0.4	42.6	28.6	42.7	0.2
R75	Residential	29.8	17.8	30.1	0.3	35.7	28.3	36.4	0.7	42.6	31.7	42.9	0.3
R76	Residential	29.8	15.9	30.0	0.2	35.7	27.0	36.2	0.6	42.6	30.5	42.8	0.3
R77	Residential	29.8	15.8	30.0	0.2	35.7	26.9	36.2	0.5	42.6	30.4	42.8	0.3
R78	Residential	29.1	28.6	31.9	2.8	44.6	39.4	45.7	1.2	51.2	42.6	51.8	0.6
R79	Residential	29.1	28.7	31.9	2.8	44.6	39.5	45.8	1.2	51.2	42.7	51.8	0.6
R80	Residential	29.1	27.9	31.5	2.5	44.6	38.8	45.6	1.0	51.2	41.9	51.7	0.5
R81	Residential	29.1	26.6	31.0	1.9	44.6	37.5	45.4	0.8	51.2	40.7	51.6	0.4
R82	Residential	29.1	27.1	31.2	2.1	44.6	38.0	45.4	0.9	51.2	41.2	51.6	0.4
R83	Residential	29.1	27.7	31.5	2.4	44.6	38.6	45.6	1.0	51.2	41.8	51.7	0.5
R84	Residential	32.9	12.5	32.9	0.0	35.5	23.2	35.7	0.2	48.3	26.6	48.3	0.0
R85	Residential	32.9	24.6	33.5	0.6	35.5	35.4	38.5	3.0	48.3	38.7	48.8	0.5
R86	Residential	32.9	24.5	33.5	0.6	35.5	35.3	38.4	2.9	48.3	38.6	48.7	0.4
R87	Residential	32.9	13.7	32.9	0.1	35.5	24.6	35.8	0.3	48.3	27.7	48.3	0.0
R88	Residential	32.9	16.6	33.0	0.1	35.5	27.7	36.2	0.7	48.3	31.0	48.4	0.1
R89	Agriculture/Silviculture	34.0	32.2	36.2	2.2	42.0	43.1	45.6	3.6	50.8	46.2	52.1	1.3
R90	Agriculture/Silviculture	34.0	37.8	39.3	5.3	42.0	48.7	49.5	7.5	50.8	51.8	54.3	3.5
R91	Agriculture/Silviculture	34.0	36.8	38.6	4.6	42.0	47.7	48.7	6.7	50.8	50.8	53.8	3.0
R92	Agriculture/Silviculture	34.0	36.0	38.1	4.1	42.0	46.9	48.1	6.1	50.8	50.1	53.5	2.7
R93	Agriculture/Silviculture	29.1	37.0	37.6	8.6	44.6	47.9	49.6	5.0	51.2	51.0	54.1	2.9
R94	Agriculture/Silviculture	29.1	33.3	34.7	5.6	44.6	44.2	47.4	2.8	51.2	47.4	52.7	1.5
R95	Agriculture/Silviculture	29.1	33.5	34.8	5.8	44.6	44.4	47.5	2.9	51.2	47.5	52.8	1.5
R96	Agriculture/Silviculture	29.1	32.4	34.1	5.0	44.6	43.3	47.0	2.4	51.2	46.4	52.5	1.2
R97	Agriculture/Silviculture	32.9	31.0	35.1	2.2	35.5	41.9	42.8	7.3	48.3	45.2	50.0	1.7
R98	Agriculture/Silviculture	29.8	35.1	36.2	6.4	35.7	45.6	46.0	10.3	42.6	48.8	49.7	7.2