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TECHNICAL REPORT

Title:	Existing Conditions Background Sound Survey and Noise Impact Assessment
Project:	Angelina Solar
Location:	Preble County, OH
Prepared For:	Angelina Solar, LLC/Open Road Renewables, LLC
Prepared By:	David M. Hessler, P.E., INCE
Revision:	0
Issue Date:	October 20, 2018
Reference No:	TM-2113-101618-0
Attachments:	**Table T-2113-101618-0** Substation Sound Propagation Calculations

1.0 Introduction

A study has been carried out for Angelina Solar, LLC to evaluate the sound emissions from the proposed Angelina Solar Energy Project located just west of Fairhaven in Preble County, Ohio in order to identify and quantitatively evaluate any possible community noise issues. Compared to other types of power generation facilities, potential noise impacts from a photovoltaic solar energy project are relatively few, relatively mild and, moreover, have the unusual characteristic of only occurring during the daylight hours when noise is much less likely to be an issue in the first place. In this case, any possible concerns about noise are largely confined to the step up transformer in the new substation, electrical inverters within the various solar fields and some short-lived activities during construction. In an effort to methodically evaluate the potential impact of the substation, a field survey was conducted to establish the current levels of background sound at the nearest residences to the proposed substation so that projections of future transformer sound could be evaluated within an appropriate context. This report summarizes the findings from that field survey and discusses the potential noise impacts associated with the project.

1.1 Executive Summary

A 14 day field survey of the existing ambient sound levels in the immediate vicinity of the future substation associated with the Angelina Solar Project has been carried out to establish the baseline environmental conditions. The survey results indicate that the sound levels in the area are extremely quiet with an average daytime L90 sound level of only 31 dBA.

The sound power level of the step up transformer associated with the proposed substation was calculated from its expected maximum MVA rating of 109 and its far field sound pressure level frequency spectrum has been mathematically projected to the nearest residences to evaluate any potential noise impact using the modified Composite Noise Rating (CNR) methodology. This approach compares the frequency spectra of the existing background level to that of the proposed project to essentially gauge its audibility relative to the natural environmental sound level. Additional adjustments are made for such factors as time of day, tonal content and the community attitude towards to the project. The result of this analysis is that no significant adverse reaction is expected from the proposed substation at any of the nearest residences, although the transformer may be intermittently audible at the landowner's residence – and it would be prudent to try to increase the setback distance of the substation to the extent possible or erect a berm to better ensure that the predicted minimal noise impact actually occurs.

Beyond the substation, there will some sound from the electrical inverters distributed throughout the solar fields. While the sound emissions from this equipment are not negligible in overall magnitude and tonal in character close to these units, the higher frequency tonal aspect drops away very quickly with distance and field measurements indicate that inverter sound fades to insignificance relative to normal background levels at a distance of 150 ft. Moreover, inverter sound is rarely audible at the perimeter fence of typical solar fields so an adverse noise impact at the nearest residences beyond the project boundary appears to be highly unlikely from this equipment. In any event, options exist to mitigate inverter sound emissions should any problem arise.

In contrast to other forms of power generation, sound emissions during construction are expected to be dramatically lower in magnitude and duration. Some unavoidable disturbance is possible when the mounting posts are driven in but this activity will be fairly short-lived in any particular location. Other sounds from trenching and road building will also be brief in duration and will progress from place to place avoiding prolonged exposure at any specific location.

In general, the potential noise impacts from all aspects of the project are expected to minimal.

2.0 Existing Conditions Sound Survey

The new substation associated with the project is currently planned for a location on the east side of County Road 600 E just north of its intersection with E. Greenwood Church Road. The nearest residence to the proposed site is the home of the landowner (of the substation property), which is approximately 400 ft. southeast of the step-up transformer. The next nearest homes are 1300 and 1500 ft. away from the substation and essentially far enough away that any kind of adverse noise impact would be highly unlikely, since the hum from a typical transformer of this size generally fades into the background and becomes largely imperceptible at a distance of roughly 500 ft. or less.

In order to quantitatively evaluate the potential noise impact of the substation, sound monitoring equipment was set up at the nearest house to measure the existing baseline ambient sound level, including its frequency content, for later comparison to the predicted sound levels from the substation. The survey was carried out over a 14 day period from March 27th through April 11th, 2018 using continuously recording sound monitors in general accordance with ANSI S12.9-R2013 "Quantities and Procedures for Description and Measurement of Environmental Sound. Part 2: Measurement of Long-term, Wide-Area Sound".

2.1 Measurement Location and Test Methodology

The tentatively planned substation location is shown in the aerial below along with the nearest residence and the background sound monitoring position.

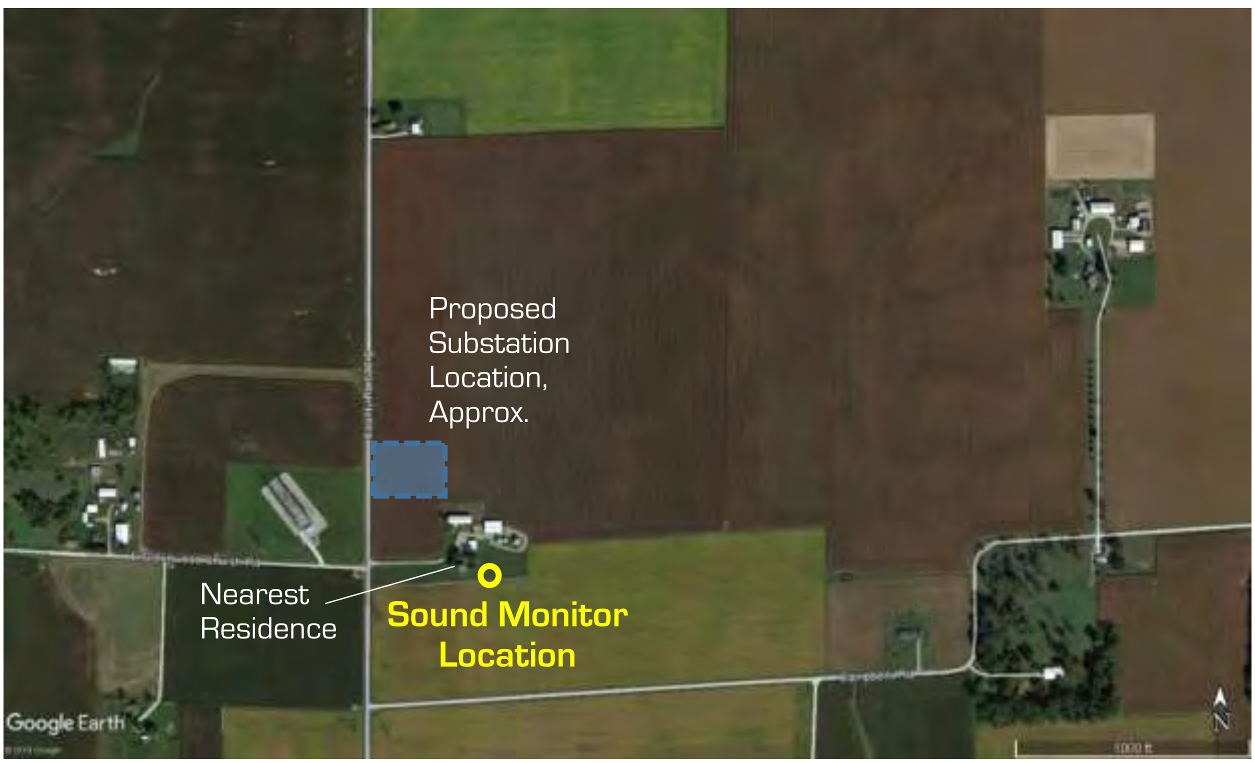

Figure 2.1.1
Substation Vicinity Showing Background Sound Measurement Location

As illustrated in Figure 2.1.2, a frequency analyzer, along with a back-up unit, were set up as a continuous sound monitors in the rear yard of the substation landowner's residence.

Figure 2.1.2
Sound Monitoring Equipment Looking WNW towards House

2.2 Survey Equipment and Measurement Parameters

A Norsonic N-140, ANSI S1.4-1983(R2006) Type 1 precision, 1/3 octave band frequency analyzer was used as the primary instrument for the survey along with a Rion Model NL-22, ANSI Type 2, environmental sound monitor for redundancy. Each instrument was field calibrated with a Brüel and Kjær Type 4230, ANSI S1.40-1984(R1990) Type 1 calibrator at the beginning and end of the survey and both meters exhibited an insignificant amount of drift (within +/-0.2 dB). Weather-treated 7 in. diameter windscreens were used to minimize self-generated distortion from wind. The microphones were fixed to temporary posts at a standard height of 1.2 m above local grade.

A variety of statistical sound levels, such as the minimum, average, maximum, etc. were measured in 10 minute increments over the 14 day survey period; however, the parameter of primary relevance and importance to this kind of survey is the "residual" or L90 percentile level, which is the sound level exceeded 90% of the time over each measurement period. Put another way, this level captures the quietest (not necessarily consecutive) 1 minute of each 10 minute interval making it a conservative measure of the near-minimum background sound level.

2.3 Survey Conditions

The weather conditions over the survey period were generally mild and conducive to the survey but there were several periods with gusty winds and rain. Most of these events were short-lived and only had a mild effect on the measurements; however, a storm on April 3 and 4 did significantly elevate the observed sound levels for an extended period, so all data collected during this period has been neglected.

3.0 Survey Results

The survey results, in terms of both the average (Leq(10 min.)) and residual (L90(10 min.)) sound levels are plotted below. Periods with elevated winds and/or precipitation are shaded in blue.

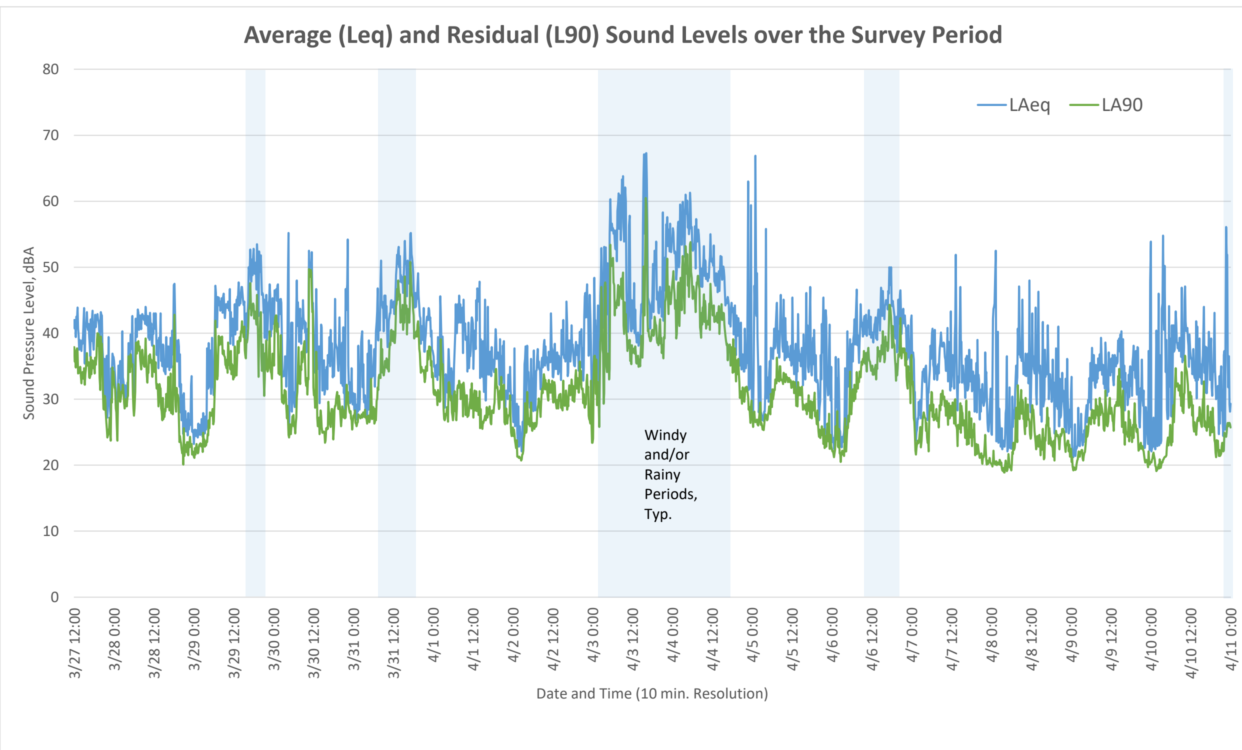

Figure 3.0.1

What these results generally show is that this environment is extremely quiet with sound levels typically in the 20 to 35 dBA range. Slightly higher, but still relatively low sound levels, occur when the wind picks up. The storm on April 3rd and 4th can be considered an excursion from the norm and this data has been neglected in subsequent averaging.

Because the project and its associated substation will only be active during the day, the baseline background sound level of relevance is the average daytime L90 sound level, typically interpreted as from 7 a.m. to 10 p.m. The average daytime sound level in octave bands observed during this survey, omitting the storm on April 3rd and 4th, is tabulated below. The overall average A-weighted sound level is an extremely low 31 dBA.

Table 3.0.1 Average Measured Daytime L90 Background Sound Level

Octave Band Center Frequency, Hz									
31.5	63	125	250	500	1k	2k	4k	8k	dBA
43.6	42.4	38.5	28.4	22.7	21.5	18.6	18.4	15.2	31.1

4.0 Sound Emissions from the Substation

4.1 Transformer Sound Level

The only noise source of any potential consequence in the new substation is the step up transformer. Any crackle from the electric lines is something that's only noticeable in or immediately around the substation itself and therefore of no significance at residences hundreds of feet away.

The input sound power level for this transformer has been conservatively estimated in octave bands in **Table T-2113-101618-0** based on the unit's maximum expected MegaVolt Ampere (MVA) rating of 109 using empirically derived algorithms from the "Electric Power Plant Environmental Noise Guide[1]" published by the Edison Electric Institute (EEI). Numerous transformers over a wide range of sizes and manufacturers were measured in the EEI study to develop a formulaic relationship between the MVA rating and sound power. The precise transformer model, rating and manufacturer for this project have not yet been finalized, but the best estimate at this time is for a 109 MVA unit.

For this size transformer, the EEI methodology nominally predicts a near field sound pressure level of 80 dBA and an associated sound power level (Lw) of 99 dBA re 1 pW[2]. Experience suggests, however, that this prediction methodology is highly conservative for modern transformers[3] and a

[1] "Electric Power Plant Environmental Noise Guide", Prepared by Bolt Beranek and Newman for the Edison Electric Institute, 2nd Ed., 1984.

[2] Sound power level is an essentially intangible quantity, used only for modeling purposes, that is calculated from the measured sound pressure level and the radiating wave front area at the point of the measurement. It is expressed in units of Watts and the designation "re 1 pW", or 'with reference to one picoWatt', is used by convention to distinguish power levels from pressure levels, which are measured in units of pressure, Pascals.

[3] The EEI study was carried out 40 years ago.

substantially lower sound power level from the actual transformer is very likely. In cases where the actual measured performance has been determined, a sound level of about 6 dB lower has been observed. Consequently, in order to be more realistic in the analysis this reduction has been taken into account in the modeled transformer sound power level, which is tabulated below.

Table 4.1.1
Estimated 109 MVA Transformer Sound Power Level (Lw) Spectrum

OBCF, Hz	31.5	63	125	250	500	1k	2k	4k	8k	**dBA**
Lw, dB re 1 pW	89	95	97	92	92	86	81	76	69	**93**

4.2 Sound Propagation Calculations

Based on the sound power level spectrum above, the sound emissions from the substation have been calculated at the nearest potentially sensitive receptors (residences) in strict accordance with ISO 9613-2 *Acoustics –Attenuation of Sound during Propagation Outdoors*[4].

In this instance, a mid-range, somewhat conservative ground absorption coefficient (Ag from ISO 9613-2) of 0.5 (on a scale of 0 to 1) has been used to represent the site vicinity, which consists of open fields. Normally, farm fields would be considered more acoustically absorptive and would warrant a higher coefficient than 0.5. There are no appreciable undulations in the area topography so a flat plane is assumed along with ISO "standard day" conditions (10 deg. C/70% RH).

4.3 Analysis of Substation Sound Levels at the Nearest Residences

The nearest residences to the proposed new substation are illustrated in Figure 4.3.1 and designated as Design Points 1 through 3.

[4] *Acoustics – Attenuation of Sound during Propagation Outdoors*, Part 2, "A General Method of Calculation," ISO 9613-2, International Organization for Standardization, Geneva, Switzerland, 1989.

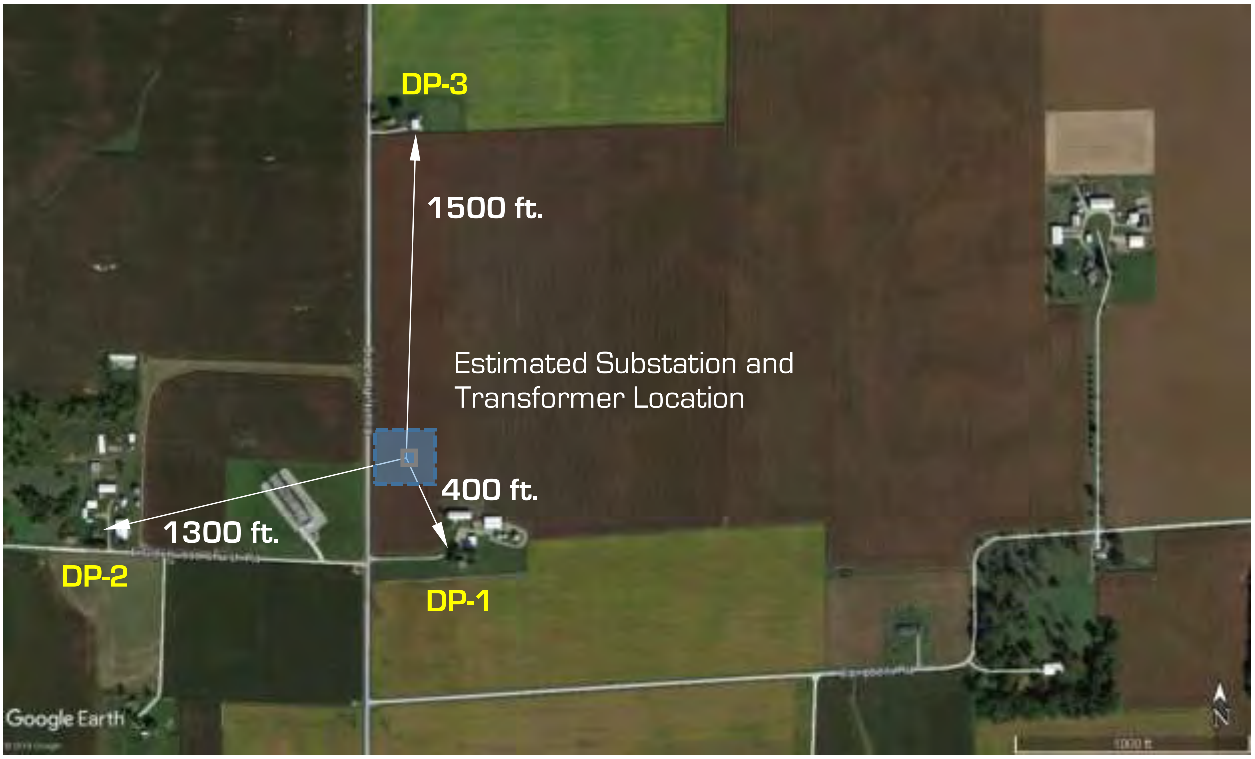

Figure 4.3.1
Substation Vicinity Showing Distances to Nearest Residences

The overall A-weighted and octave band sound levels from the proposed substation transformer at each of these receptors are calculated in Table T-2113-101618-0. Because transformer noise is characterized by hums and tones, its frequency content is generally of more importance than its overall magnitude. An assessment approach that uses the frequency spectrum of the source and the background to evaluate potentially intrusive noise and predict community reaction is the modified Composite Noise Rating, or CNR, method.

The first step in the evaluation process is to plot the octave band frequency spectrum of the predicted project-only sound level at points of interest against a set of curves that generally map the perceptibility of the noise as a function of frequency. Figure 4.3.2 below shows the predicted project sound level spectra at the three design points:

- DP-1 The nearest residence to the south (400 ft.)
- DP-2 The nearest residence to the west (1300 ft.)
- DP-3 The nearest residences to the north (1500 ft.)

A lower-case initial classification letter, applicable to the regions between each curve, is assigned according to the highest region that the spectrum touches.

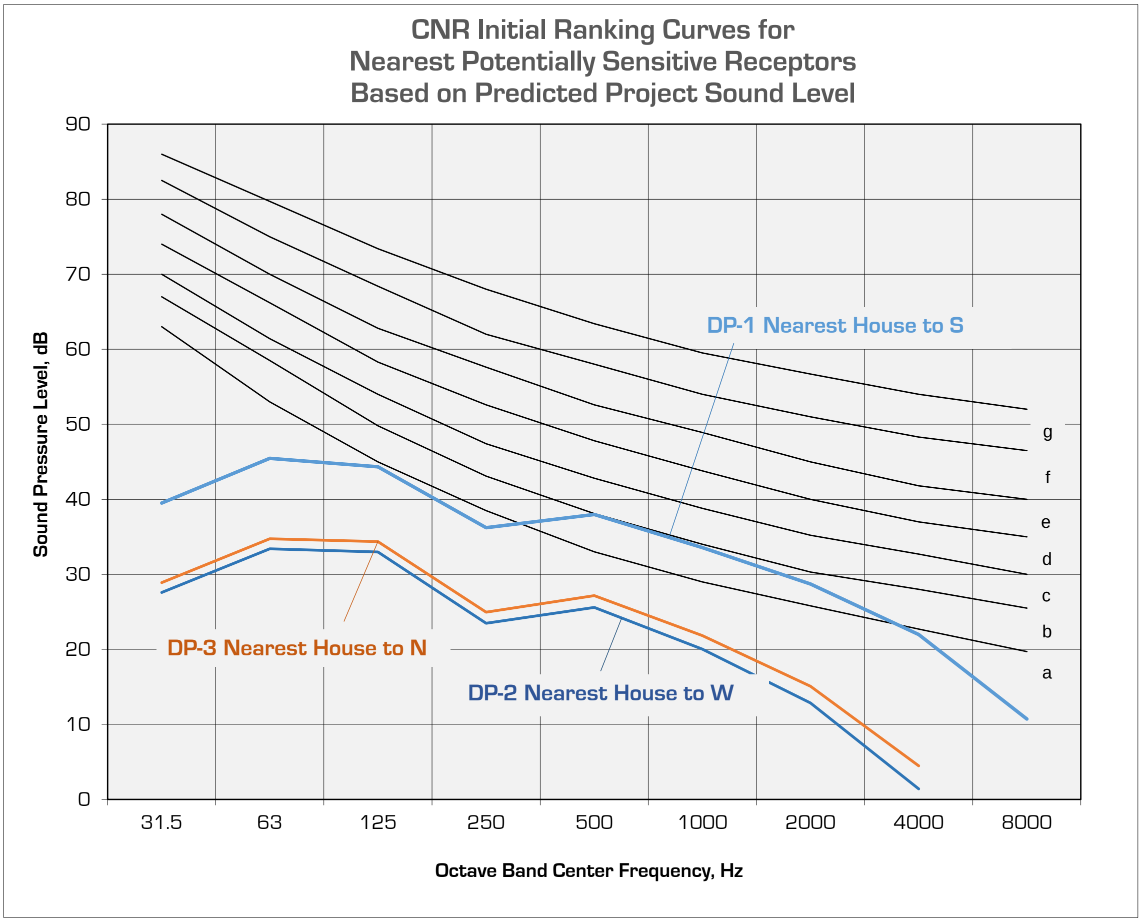

Figure 4.3.2

The initial ranking for DP-1 is "**b**" while the other two design points are well into the lowest "**a**" zone.

Starting from this baseline rating classification a series of corrections and adjustments are made to estimate the final classification, which, in turn, gives an indication of the potential community reaction.

The first principal correction is for background masking noise. A second chart of curves is used to determine how well or how poorly the background sound level frequency spectrum would act to mask the project sound level. The highest region intercepted determines the correction factor. Figure 4.3.3 plots the average daytime L90 sound level measured over two weeks at DP-1, which may be taken to represent the ambient sound level in the general area; i.e. at the other nearby residences as well.

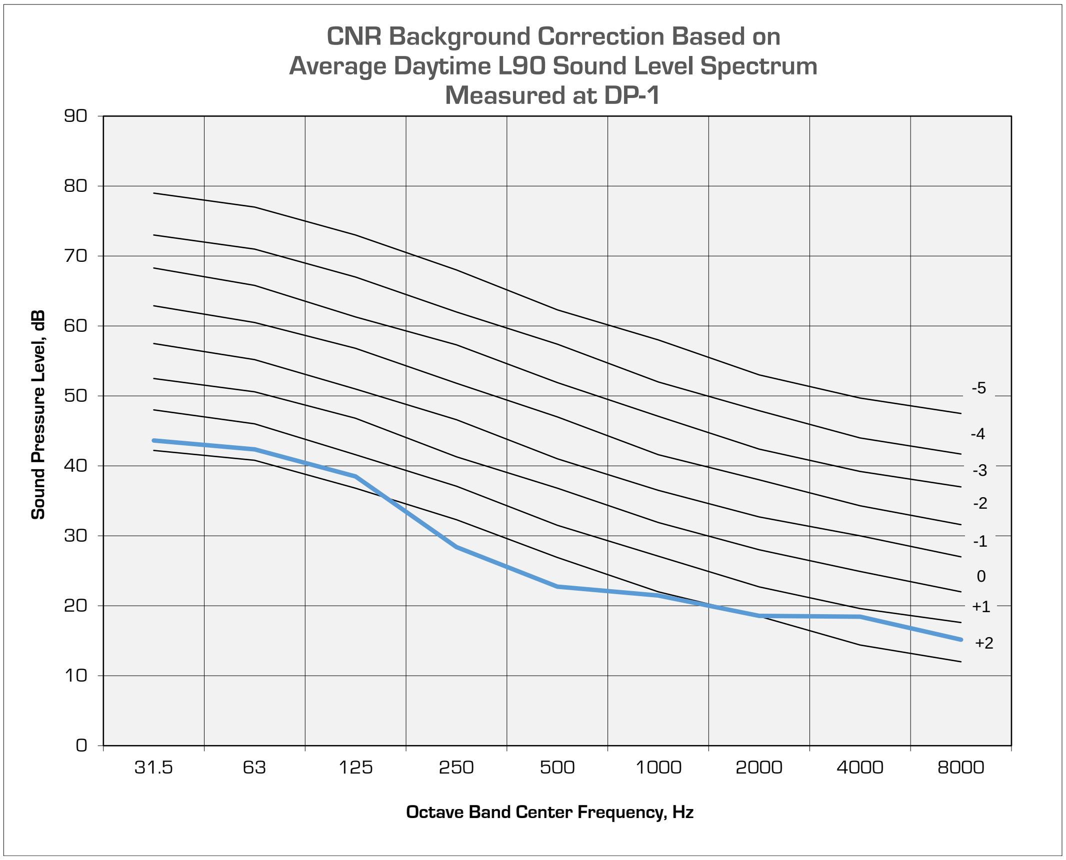

Figure 4.3.3

This chart indicates that the very low background sound level in this rural setting results in a correction of **+2**. In general, positive corrections are a kind of penalty.

The remaining corrections to the baseline CNR rating relate to the temporal nature of the new noise source, its character and the general attitude of observers.

The temporal correction accounts for the duration of the ostensibly intruding noise; i.e. when it occurs (during the day or night) and whether it changes with the seasons. Since the project is only active when the sun is shining, a correction of **-1** for daytime only operation would apply at all design points.

Next, a character correction takes into consideration the fact that noises that contain any kind of tone, impulse or excessive low frequency content are more apt to be considered objectionable than a broadband noise of the same magnitude. In this case, transformers are tonal noise sources, but only at fairly short distances, roughly at 500 to 600 ft. or less. Consequently, in this case, a penalty of **+1** may be taken for DP-1, since it is only about 400 ft. from the transformer and some hum or buzz may still be intermittently audible. This is not the case, however, for the next nearest homes, which are well beyond the point where any tones would be significant or readily noticeable.

The final correction factor, ranging from -1 to +1, is associated with previous exposure and attitude as delineated in the following table.

Table 4.3.3.1
CNR Correction Factors Related to Receptor Attitude

CNR Correction Factor	Previous Exposure and Attitude
-1	Considerable previous exposure and/or good community relations
0	Some previous exposure and good community relations
+1	No previous exposure or some previous exposure and poor community relations

The general community attitude towards this project is not known but there is no reason to believe that community relations are poor; consequently, the fairest interpretation of this factor seems to be a neutral rating of **0**. However, because the nearest design point is the home of the landowner leasing the property on which the substation may be constructed, one would expect a fairly favorable outlook on the project, so it would not be unreasonable to assign positive rating of **-1** for this design point.

The final CNR classification for a specific receptor location is determined by applying the net correction to the baseline letter grade. For example, a baseline rating of "c" with a net correction of -1 would result in a final rating of "B", or one letter below the starting value. In this case the corrections and final ratings for the key design points are summarized below.

Table 4.3.3
Summary of CNR Correction Factors and Final Rating

Correction	Correction Factor		
	DP-1	**DP-2**	**DP-3**
Initial Rating based on Model Prediction	**b**	**a**	**a**
Background Correction	+2	+2	+2
Temporal/Seasonal Correction	-1	-1	-1
Character Correction	+1	0	0
Exposure and Attitude	-1	0	0
Net Correction	**+1**	**+1**	**+1**
Final Rating	**C**	**B**	**B**

The nominal meaning of these final ratings is given in the chart below.

Table 4.3.4
Final CNR Ratings and Predicted Reactions

Final CNR Rating	Significance
A	No Reaction
B	No Reaction
C	No Reaction to Sporadic Complaints
D	Sporadic Complaints
E	Widespread Complaints or Single Threat of Legal Action
F	Several Threats of Legal Action or Strong Appeals to Local Officials to Stop the Noise
G	Several Threats of Legal Action or Strong Appeals to Local Officials to Stop the Noise
H	Several Threats of Legal Action or Strong Appeals to Local Officials to Stop the Noise
I	Vigorous Action

The ratings of **B** and **C** indicate that "no reaction" or essentially no reaction is anticipated at all of the nearest potentially sensitive receptors. Nevertheless, some additional distance between the substation and the nearest house (DP-1), if there is any way to shift the location of the substation to the north by several hundred feet, would better ensure this outcome. Another possible preventative (or remedial) measure would be to erect a berm on the south side of the substation to block the line of sight between the house and the transformer.

Because the sound emissions from the project substation are expected to be essentially negligible at design points 2 and 3, 1300 and 1500 ft., respectively, from the substation, the potential noise impact at more distant receptors has not been evaluated in this study - as would normally occur per State guidelines (OAC 4906-4-08(A)(3)(c) for a wind turbine or fossil fuel project.

5.0 Sound Emissions from Other Sources

With the possible exception of substations, photovoltaic power projects generate very little environmental noise. The only other sound sources of any possible significance are the electrical inverters used to convert locally generated DC current into AC power that is then routed to the substation through underground collector cables. Typically these electrical cabinets are situated within and near the center of each solar field, or independent group of solar panels, so they are usually a considerable distance from the perimeter fence and potential neighbors beyond. Generally speaking, these electrical cabinets emit sound levels on the order of 60 to 70 dBA at 10 ft. due mostly to the cooling fans and, at this very close-in distance, the sound can be characterized as a hum sometimes with overlying ringing tones in the high frequencies. Since high frequency sound diminishes rapidly with distance the ringing aspect of the sound, if present, dies out very quickly and the sound at any significant distance consists of bland, broadband fan noise, if it is audible at all.

The precise make and model of the inverters for the Angelina project has not yet been selected so their sound emissions cannot be modeled or rigorously evaluated at this time. However, a field study of typical inverter sound emissions at several existing large-scale solar facilities - that was carried out for the Massachusetts Clean Energy Center, an agency of the State government, in 2012[5] - indicates that any noise from these cabinets generally drops into the background level and becomes insignificant at a distance of 150 feet and that they are rarely audible at or beyond the perimeter fence. Consequently, it is expected that any conventional solar field layout will result in a situation where inverter noise is inconsequential at the project boundary making any adverse impact on neighbors highly unlikely. Nevertheless, if this sound source were to unexpectedly generate complaints, options, such as cabinet damping and ventilation silencers, would be available to retroactively mitigate noise from these devices and resolve any issue.

One other possible sound source might be the small motors that (very) slowly rotate the panels so that they track the sun over the course of each day. However, the sound emissions from these motors are thought to be inconsequential even immediately adjacent to them, so no significant community noise impact is anticipated.

During normal operation the facility does not require an operator or any full time staff, so there clearly wouldn't be any noise impacts from traffic. The site would only be occasionally visited by maintenance personnel.

6.0 Sound Emissions during Construction

In contrast to other forms of power generation, the construction phase of a solar energy facility is remarkably short and the activities that generate any significant noise are few. Where a fossil or wind project would require extensive earthworks and the pouring of massive concrete foundations, a solar plant only involves the installation of the mounting posts for the panel racks. No concrete foundations are used for the panel arrays. There are two basic methods of erecting the posts: driving or rotating screw bases. If the posts are driven in, it is essentially a small-scale pile driving operation that produces a repetitive, metallic pounding noise, which will be clearly audible for some distance and could cause some unavoidable disturbance. On the other hand, this activity is short-lived and would proceed fairly quickly, only occurring for a period of days or a couple of

[5] Guldberg, P., Tech Environmental, "Study of Acoustic and EMF Levels from Solar Photovoltaic Projects", Prepared for the Massachusetts Clean Energy Center, Boston, Dec. 2012.

weeks in any one locality. If the posts are screwed in there might be some local noise from the driving apparatus; however, any community impact is likely to be minimal.

In terms of the more traditional construction phases, the table below gives some representative sound levels from construction equipment at 50 feet[6], which, in this case, may be conservatively interpreted as the site property boundary. These sound levels might be temporarily produced very close to where the work is occurring.

Table 6.0.1
Typical Construction Equipment Sound Levels per FHWA by Phase

Equipment Description	Typ. Sound Level at 50 ft., dBA	Est. Maximum Total Level at 50 ft. (Property Boundary) per Phase, dBA[1]
Blasting		
n/a		n/a
Earthmoving Road Construction and Electrical Line Trenching		
Dozer	85	85
Front End Loader	80	
Grader	85	
Backhoe	80	
Support Post Installation		
Vermeer PD10 Pile Driver[2]	84	84 (Impulsive for Driven Posts)
Drill Rig Truck	84	84 (Broadband for Screwed Posts)
Truck Traffic Material Delivery		
Flatbed Truck	84	84
Erection Panel Installation		
Mobile Crane	85	85

Note 1: Not all vehicles are likely to be in simultaneous operation. Maximum level represents the highest level realistically likely at any given time.
Note 2: Based on manufacturer's information.

As indicated in the table, no blasting is anticipated for the project. Additionally, there is no need for concrete pouring throughout the solar fields. The base slabs for the inverters and other electrical equipment will be precast and dropped in place. Concrete pouring is only likely for the transformer base in the substation. A concrete pump truck typically generates a sound level of

[6] U. S. Dept. of Transportation, Federal Highway Administration, *Roadway Construction Noise Model User's Guide*, Table 1, Jan. 2006.

about 82 dBA at 50 feet[7], or the boundary of the substation. At the nearest house (DP-1, 400 ft.) this sound level would decrease to around 62 dBA and occur only intermittently during the day; most likely only for a day or two.

7.0 Conclusions

A 14 day field survey of the existing ambient sound levels in the immediate vicinity of the future substation associated with the Angelina Solar Project has been carried out to establish the baseline environmental conditions. The survey results indicate that the sound levels in the area are extremely quiet with an average daytime L90 sound level of only 31 dBA.

The sound power level of the step up transformer associated with the proposed substation was calculated from its expected maximum MVA rating of 109 and its far field sound pressure level frequency spectrum has been mathematically projected to the nearest residences to evaluate any potential noise impact using the modified Composite Noise Rating (CNR) methodology. This approach compares the frequency spectra of the existing background level to that of the proposed project to essentially gauge its audibility relative to the natural environmental sound level. Additional adjustments are made for such factors as time of day, tonal content and the community attitude towards to the project. The result of this analysis is that no significant adverse reaction is expected from the proposed substation at any of the nearest residences, although the transformer may be intermittently audible at the landowner's residence – and it would be prudent to try to increase the setback distance of the substation to the extent possible or erect a berm to better ensure that the predicted minimal noise impact actually occurs.

Beyond the substation, there will some sound from the electrical inverters distributed throughout the solar fields. While the sound emissions from this equipment are not negligible in overall magnitude and tonal in character close to these units, the higher frequency tonal aspect drops away very quickly with distance and field measurements indicate that inverter sound fades to insignificance relative to normal background levels at a distance of 150 ft. Moreover, inverter sound is rarely audible at the perimeter fence of typical solar fields so an adverse noise impact at the nearest residences beyond the project boundary appears to be highly unlikely from this equipment. In any event, options exist to mitigate inverter sound emissions should any problem arise.

In contrast to other forms of power generation, sound emissions during construction are expected to be dramatically lower in magnitude and duration. Some unavoidable disturbance is possible when the mounting posts are driven in but this activity will be fairly short-lived in any particular location. Other sounds from trenching and road building will also be brief in duration and will progress from place to place avoiding prolonged exposure at any specific location.

[7] Ibid.

In general, the potential noise impacts from all aspects of the project are expected to minimal.

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Table:	**T-2113-101618-0**
Title:	**Substation Transformer Sound Propagation Calculations**
Project:	**Angelina Solar**
Revision:	**0**
Date:	**10/19/18**

Octave Band Center Frequency, Hz

1. Sound Power Level Estimate Based on MVA Rating, Assume Standard Core

Descriptor			31.5	63	125	250	500	1000	2000	4000	8000	dBA	dBC
Maximum Expected MVA Rating	**106**	MVA										98	
Standard NEMA Rating		NEMA = 55 +12 log (MVA), per EEI Guide*										79	
Size Factor (10 log s) Based on MVA												19	
Frequency Adjustment Factors			-3	3	5	0	0	-6	-11	-16	-23		
Near Field Lp Based on NEMA Rating			76	82	84	79	79	73	68	63	56	80	
Nom. Lw = NEMA Rating + 10 log s			95	101	103	98	98	92	87	82	75	99	
Observed Conservatism Calc vs. Meas.			-6	-6	-6	-6	-6	-6	-6	-6	-6		
Likely Actual Lw			**89**	**95**	**97**	**92**	**92**	**86**	**81**	**76**	**69**	**93**	

* Edison Electric Institute, "Electric Power Plant Environmental Noise Guide", 2nd Ed., BBN, 1984.

2. Calculated Sound Pressure at DP-1

Descriptor			31.5	63	125	250	500	1000	2000	4000	8000	dBA	dBC
Path Attenuation:													
Source Receiver Distance	**122**	m		**400** ft.									
Hemispherical Distance Loss, m	122		-50	-50	-50	-50	-50	-50	-50	-50	-50		
Air Absorption (10°C / 70%RH), m	122		0	0	0	0	0	-1	-1	-2	-6		
Anomalous Attenuation, m	122		0	0	0	0	0	-1	-1	-1	-2		
Number of Sources	1		0	0	0	0	0	0	0	0	0		
Ground Attenuation per ISO 9613-2	Ag = 0.5		0	0	-3	-6	-4	-2	-1	-1	-1		
Sum of Path Attenuation:			-50	-50	-53	-56	-54	-53	-53	-54	-59		
Est. Receptor Lp			**40**	**45**	**44**	**36**	**38**	**34**	**29**	**22**	**11**	**39**	

3. Calculated Sound Pressure at DP-2

Descriptor			31.5	63	125	250	500	1000	2000	4000	8000	dBA	dBC
Path Attenuation:													
Source Receiver Distance	**396**	m		**1300** ft.									
Hemispherical Distance Loss, m	396		-60	-60	-60	-60	-60	-60	-60	-60	-60		
Air Absorption (10°C / 70%RH), m	396		0	0	0	0	-1	-2	-4	-8	-21		
Anomalous Attenuation, m	396		0	-1	-1	-1	-1	-2	-3	-4	-5		
Number of Sources	1		0	0	0	0	0	0	0	0	0		
Ground Attenuation per ISO 9613-2	Ag = 0.5		0	0	-2	-6	-3	-1	0	0	0		
Sum of Path Attenuation:			-60	-61	-63	-67	-65	-65	-66	-72	-86		
Est. Receptor Lp			**29**	**35**	**34**	**25**	**27**	**22**	**15**	**4**	**-16**	**28**	

4. Calculated Sound Pressure at DP-3

Descriptor			31.5	63	125	250	500	1000	2000	4000	8000	dBA	dBC
Path Attenuation:													
Source Receiver Distance	**457**	m		**1500** ft.									
Hemispherical Distance Loss, m	457		-61	-61	-61	-61	-61	-61	-61	-61	-61		
Air Absorption (10°C / 70%RH), m	457		0	0	0	-1	-1	-2	-4	-9	-24		
Anomalous Attenuation, m	457		0	-1	-1	-1	-2	-2	-3	-4	-6		
Number of Sources	1		0	0	0	0	0	0	0	0	0		
Ground Attenuation per ISO 9613-2	Ag = 0.5		0	0	-2	-6	-3	-1	0	0	0		
Sum of Path Attenuation:			-62	-62	-64	-69	-67	-66	-69	-75	-91		
Est. Receptor Lp			**28**	**33**	**33**	**23**	**26**	**20**	**13**	**1**	**-22**	**26**	

Notes:
Lp = Sound Pressure Level, dB re 20 mPa
Lw = Sound Power Level, dB re 1 pW

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Summary: Application Exhibit E electronically filed by Mr. Michael J. Settineri on behalf of Angelina Solar I, LLC