



SOMERSET SOLAR, LLC

MATTER NO. 22-00026

§900-2.8 Exhibit 7 Revised

Noise and Vibration

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ACRONYM LIST

§	Section
dBA	A-weighted decibel
dB	decibels
Facility Site	the approximately 700-acre limit of disturbance for the Facility
Facility Substation	Somerset Collector Substation
HDD	horizontal directional drilling
HVAC	heating, ventilation and air conditioning
L ₉₀	sound level exceeded 90 percent of the time
L _{eq}	equivalent continuous sound level
NSA	noise sensitive area
NYCRR	New York Codes, Rules and Regulations
PNIA	Pre-Construction Noise Impact Assessment
Town	Town of Somerset, Niagara, County, New York
WHO	World Health Organization

GLOSSARY TERMS

Applicant	Somerset Solar, LLC, a subsidiary of The AES Corporation, Inc. (AES), the entity seeking a siting permit for the Facility Site from the Office of Renewable Energy Siting (ORES) under Section (§) 94-c of the New York State Executive Law.
Application	Application under §94-c of the New York State Executive Law for review by the ORES for a Siting Permit.
Facility	The proposed components to be constructed for the collection and distribution of energy for the Somerset Solar Facility, which includes solar arrays, inverters, electric collection lines, and the collection substation.
Facility Site	The limit of disturbance (LOD) that will be utilized for construction and operation of the Facility, which totals about 700 acres on the Project Parcels in the Town of Somerset, Niagara County, New York (Figure 2-1).
Project Parcels	The parcels that are currently under agreement with the Applicant and Landowner, totaling about 1,784 acres in the Town of Somerset, Niagara County, New York, on which the Facility Site will be sited (Figure 3-1).
Project Site	The acreage of the Project Parcels under agreement between the Applicant and the Landowner, consisting of approximately 1,396 acres, in which the Applicant has performed diligence, surveys and assessments in support of Facility design and layout.

EXHIBIT 7 NOISE AND VIBRATION

This exhibit addresses the requirements specified in 19 New York Codes, Rules and Regulations (NYCRR) Section (§) 900-2.8. A study was conducted to confirm that any noise and vibrational impacts resulting from construction and operation of the Facility will not exceed the design goals listed within the regulations of §94-c of the New York State Executive Law. Adverse noise impacts were avoided or minimized through careful siting of components within the 700-acre Facility Site. The noise emitted by a solar project is limited to daylight periods only for the majority of the components. With the proposed mitigation at the Somerset Collector Substation (Facility Substation), and at the eastern property line of Area 5 for two of the Sungrow 3600 inverters located south of New York State Route 18/Lake Road (Appendix 5-A, Sheet PV-C.02.05 and Appendix 5-B, Sheets HV-P.01.01 and HV-P.02.01) the Facility complies with both the Town of Somerset (Town) Noise Ordinance and the Uniform Standards and Conditions at 19 NYCRR §900-2.8. This exhibit provides further discussion of potential noise impacts, based on the noise assessment completed for the Facility (Appendix 7-A), and the proposed mitigation that ensure noise emitted from the Facility is in compliance with the applicable noise regulations. The Facility has been designed to comply with 19 NYCRR §900-2.8 and the Uniform Standards and Conditions; and impacts related to noise and vibration have been avoided and minimized to the maximum extent practicable.

7(a) Name of Preparer

This exhibit includes a detailed analysis of the potential sound impacts associated with the construction and operation of the Facility. This exhibit and the modeling results provided in Appendix 7-A were prepared by Mr. Chris Hulik, with oversight and review provided by Ms. Tricia Pellerin of Tetra Tech, Inc. Mr. Hulik has over 8 years of experience in the areas of community noise impacts, sound level data collection, and analyses. He is a member of the Institute of Noise Control Engineering. Ms. Pellerin has over 17 years of experience including conducting the planning and permitting of many small- and large-scale acoustic assessments for solar facilities within the New York State and in many other jurisdictions. The modeling performed by Tetra Tech, Inc. for the Facility is sufficiently conservative in predicting sound impacts, and includes all proposed inverters plus ancillary equipment, and the Facility Substation operating at their maximum capacities.

7(b) Noise Design Goals for the Facility

The Pre-Construction Noise Impact Assessment (PNIA) (Appendix 7-A) demonstrates that noise levels from noise sources at the Facility will comply with the requirement of this exhibit as follows:

- In assessing compliance with the thresholds in §900-2.8(b)(2)(i), (ii) and (iv) a 5-decibel (dB) penalty was applied at all sound receptors resulting from the tonality of the SG3600 inverter skid, high voltage Facility Substation transformer in the ONAN¹ and ONAF² conditions, the tracking motors, and control room heating, ventilation and air conditioning (HVAC) equipment (Appendix 7-A, Sections 5.2 and 6.2; and section 7(e) of this exhibit below);

Considering the 5-dB tonal penalty, the PNIA determined the following:

- Mitigated sound levels are at or below 45 A-weighted decibel (dBA) equivalent continuous sound level (L_{eq}^3) (8-hour) (with a tonal penalty) at all receptors, both participating and non-participating, therefore the Facility complies with the thresholds in §900-2.8(b)(2)(i) (Appendix 7-A, Section 6.2);
- Mitigated sound levels at all non-participating property lines are at or below 43 dBA L_{eq} (8-hour), well below the 55 dBA L_{eq} (8-hour) threshold in §900-2.8(b)(2)(iv) (Appendix 7-A, Section 6.2); and
- The Mitigated Facility Substation transformer and control room HVAC equipment is at or below 40 dBA L_{eq} (1-hour) (with a tonal penalty) at the outside of all non-participating residences, therefore the Facility complies with the 40-dBA L_{eq} (8-hour) threshold in §900-2.8(b)(2)(ii) (Appendix 7-A, Section 6.2). The PNIA modeled sound pressure levels from the Facility Substation transformer exclusively.

7(c) Radius of Evaluation

The PNIA included all sensitive receptors within 3,000 feet from the edge of the Project Site, which includes all sensitive receptors within the 30 dBA⁴ operational noise contour. The Kintigh Substation is located on the Project Site, adjacent to the eastern edge of the Facility Site. The Kintigh Substation has been operating for more than 25 years and is part of the existing ambient acoustic environment in the vicinity of the Facility. During the ambient sound surveys conducted in support of Facility permitting, ambient noise station ML-1 was positioned approximately 1,700 feet from the Kintigh Substation, while the nearest non-participating noise sensitive area (NSA) (ID 172) is approximately 1,000 feet from the Kintigh Substation. The measured ambient sound level exceeded 90 percent of the time (L_{90}) at ML-1 was 25 dBA during the night during the 4-day

¹ ONAN – Oil Natural Air Natural; simple transformer cooling method using natural convection

² ONAF – Oil Natural Air Forced; forced circulation using fans for air cooling

³ L_{eq} – equivalent continuous sound level

⁴ dBA – A-weighted sound levels are adjusted to reflect how a noise is perceived by the human ear

leaf-on ambient sound survey. The measured ambient L_{90} at ML-1 would be inclusive of the Kintigh Substation operations while also excluding transitive sound sources such as traffic on nearby roadways. The measured ambient L_{90} sound level is not expected to change significantly between ML-1 and nearby NSA ID 172 as they experience the same ambient environment. The L_{90} ambient sound level measured during the ambient sound survey indicates that any operational sound contribution associated with the Kintigh Substation at ML-1, and consequently NSA ID 172, would be minimal. Therefore, it is not expected that operations from the Kintigh Substation would result in any material cumulative noise impacts at NSA ID 172 or any other NSAs identified and analyzed for the Facility.

No other existing solar facilities or existing substations were identified within the cumulative noise analysis. Receptor information can be found in Appendix 7-A, Attachment 3.

7(d) Modeling Standards, Input Parameters, and Assumptions

Modeling for the Facility was completed using Datakustik's CadnaA® noise modeling software and in accordance with the standard ISO 9613-2, "Acoustics – Attenuation of sound during propagation outdoors, Part 2: General Method of Calculation." ISO 9613-2 also assumes downwind sound propagation between every source and every receptor, consequently, all wind directions, including the prevailing wind directions, are taken into account. The Project Site was modeled with half porous and half hard ground ($G=0.5$). No foliage attenuation was included in the model. Model input parameters are listed in Appendix 7-A, Section 5.2. A 1.5-meter (5-foot) receptor height was used for modeling discrete receptors (like homes and worst-case property line points) and contour mapping. All equipment was modeled as operating simultaneously and at the manufacturer's published maximum sound power levels.

A description of the modeling assumptions is included in Appendix 7-A, Section 5. The location of all operating equipment included in the noise model is given in Appendix 7-A, Attachment 3. Sound specifications for the operating equipment are given in Appendix 7-A, Attachment 4. A list of the modeling sources is presented in Appendix 7-A, Attachment 3. Table 7-1 below summarizes the noise model parameter settings.

Table 7-1. Model Parameter Settings

Model Parameter	Setting
Atmospheric Absorption	Based on 50° Fahrenheit/10° Celsius and 70% relative humidity
Foliage	No Foliage Attenuation
Ground Absorption	ISO 9613-2 spectral, G=0 for waterbodies and G=0.5 elsewhere
Receiver Height	5 feet for sound level isolines and discrete receptors
Search Radius	1 mile from each source

For all sensitive sound receptors and the most critically impacted external property boundary lines of the Facility, maximum A-weighted dBA L_{eq} sound pressure levels and maximum linear/unweighted/Z dB L_{eq} sound pressure octave levels from 31.5 Hertz (Hz) to 8,000 Hz for unmitigated and mitigated operations are provided in Appendix 7-A, Attachment 1 Tables A-1, A-2, A-3, and A-4. These tables conform to the format specified within subdivision (q)(2) of §94-c requirements identified in §900-2.8.

A summary of the number of receptors exposed to unmitigated and mitigated sound levels greater than 35 dBA is provided in Appendix 7-A, Section 6.2 and summarized in Table 7-2 and Table 7-3 of this exhibit below. Sound level contours of the noise impacts are provided in Appendix 7-A, Section 6, Figures 18 through 27.

Table 7-2. Non-Participating Sensitive Receptors at Unmitigated Sounds Levels Above 35 dBA

Sound Pressure Level – Maximum L_{8H} (dBA)	Number of Nonparticipating Sensitive Receptors			
	Full Operations		Facility Substation-Only	
	Without Tonal Penalty	With Tonal Penalty	Without Tonal Penalty	With Tonal Penalty
35	1	3	0	3
36	0	4	1	5
37	0	5	0	5
38	1	8	0	2
39	0	2	0	0
40	0	1	0	0
41	0	0	0	1
42	0	0	1	0
43	1	1	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0

Sound Pressure Level – Maximum L _{8H} (dBA)	Number of Nonparticipating Sensitive Receptors			
	Full Operations		Facility Substation-Only	
	Without Tonal Penalty	With Tonal Penalty	Without Tonal Penalty	With Tonal Penalty
47	0	0	0	1
48	0	1	0	0
49	0	0	0	0

dBA – A-weighted decibels

L_{8H} - 8 hour equivalent continuous A-weighted sound pressure level

Table 7-3. Non-Participating Sensitive Receptors at Mitigated Sounds Levels Above 35 dBA

Sound Pressure Level – Maximum L _{8H} (dBA)	Number of Nonparticipating Sensitive Receptors			
	Full Operations		Facility Substation-Only	
	Without Tonal Penalty	With Tonal Penalty	Without Tonal Penalty	With Tonal Penalty
35	0	2	1	3
36	1	10	0	4
37	0	2	0	1
38	0	5	0	0
39	0	1	0	1
40	1	0	0	1
41	0	1	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	1	0	0

dBA – A-weighted decibels; L_{8H} – 8-hour average

7(e) Prominent Tones

An assessment for tonal prominence of the SG3600UD-MV inverter skid and SG3150U-MV inverter skid was conducted through the procedure in ANSI/ASA S12.9-2013 Part 3, Annex B, Section B.1. The Manufacturer, Sungrow Power, provided the inverter skid sound power levels to be used in the assessment. Octave band data for the Facility Substation transformer is not available at this time but was calculated using the methodology recommended by the Electric Power Plant Environmental Noise Guide (Volume 1, 2nd edition) (Edison Electric Institute 1983) and therefore is considered tonal. Octave band data for the HVAC equipment and tracking motors is not available and therefore are considered tonal per §900-2.8(e)(2). As shown in Table 7-4, the

SG3600UD-MV inverter skid is considered tonal while the SG3150U-MV inverter skid is not considered tonal. Table 7-4 shows the tonal properties of the inverter and distribution transformer.

Table 7-4. Tonal Properties of Operational Equipment

Frequency	SG3600UD-MV Inverter Skid			SG3150U-MV Inverter Skid (dB)
	Inverter (dB)	Distribution Transformer (dB)	Inverter and Distribution Transformer (dB)	
20	70.2	62.4	70.9	74
25	76.2	66.7	76.7	76.2
31.5	81.3	60.3	81.3	80.9
40	82.4	55.9	82.4	70.8
50	81.6	57.4	81.6	69.8
63	80.4	55.3	80.4	70.4
80	79.2	53.7	79.2	71.7
100	80.2	58.1	80.2	71.5
125	84.0	70.3	84.2	80.0
160	79.6	55.3	79.6	69.0
200	77.5	57.1	77.5	66.6
250	80.8	72.1	81.3	69.3
315	83.4	56.7	83.4	70.7
400	87.0	59.6	87.0	62.9
500	85.6	58.9	85.6	64.4
630	80.6	55.7	80.6	66.8
800	78.2	54.2	78.2	64.2
1000	76.0	48.8	76.0	64.6
1250	74.2	45.2	74.2	64.9
1600	74.5	41.5	74.5	63.1
2000	75.0	37.6	75.0	64.6
2500	76.4	33.7	76.4	65.9
3150	74.9	30.9	74.9	73.1
4000	70.7	28.8	70.7	73.6
5000	87.6	27.6	87.6	65.4
6300	80.2	26.3	80.2	63.7
8000	73.9	23.9	73.9	65.4
10000	73.1	22.6	73.1	53.0

Note: Cells with red data indicate a tonal exceedance
dB - decibels.

With mitigation, the Facility meets the design criteria specified in §900-2.8(b)(2) based on modeling that assumes a 5-dB tonal penalty for the SG3600UD-MV inverter skid, high voltage

Facility Substation transformer in the ONAN and ONAF conditions, the tracking motors, and control room HVAC equipment.

7(f) Low Frequency Noise for Wind Facilities

This subsection of this exhibit is not applicable to this Facility.

7(g) Infrasound for Wind Facilities

This subsection of this exhibit is not applicable to this Facility.

7(h) Sound Study Area

Maps of the study area showing the location of sensitive sound receptors in relation to the Facility are provided in Appendix 7-A, Section 6, Figures 18 through 27. Appendix 7-A, Attachment 2 includes receptors with Parcel Tax ID numbers (Tax ID numbers also are included in Appendix 7-A, Table A-1 through A-5).

7(i) Evaluation of Ambient Pre-Construction Baseline Noise Contours

The surrounding ambient acoustic environment consists of car and truck traffic along New York State Route 18/Lake Road, operation of the existing Kintigh Substation, agricultural operations, and train noise. Historically, the area's soundscape has also been dominated by industrial activities associated with the former coal plant, Somerset Station, which includes portions of a railway that was used to deliver coal to the plant. The former 675-megawatt coal-fired power plant is in the process of being decommissioned⁵, with completion of all decommissioning activities expected to be completed prior to construction of the Facility. A copy of the decommissioning plan for the coal plant is provided in Appendix 6-C.

A detailed monitoring program was developed to assess the background sound levels for the variety of soundscapes that exist within the Project Site. Monitoring sites were distributed throughout the Project Site to be as representative as possible of the broader local soundscapes experienced in the immediate region. Six monitoring locations were selected as representative of the different ambient soundscapes in the area. The various representative areas included rural

⁵ Demolition and removal of former coal plant structures are the responsibility of the Project Site landowners and these activities are ongoing. The Applicant understands these activities are expected to be completed prior to initiation of Facility construction. With the exception of the portion of the railroad line that is located within the Facility Site, all of the facilities that are part of the former coal plant that have been or will be demolished are located outside the Project Site. Portions of the railroad that are located on the Project Site have been removed, and any stockpiled materials associated with the former rail line that currently remain, are anticipated to be removed from the Project Site prior to initiation of Facility construction (J. Marabella, personal communication).

residential, farming, and remote areas. The six selected monitoring locations are shown in Table 7-5, while the overall monitoring results are shown in Table 7-6 for ANS-weighted⁶, and Table 7-7 for A-weighted. More detail including the representative monitoring locations, methodology, and data analysis can be found in Appendix 7-A, Section 4.

Table 7-5. Representative Monitoring Sites

Monitoring Location	Site Name		Location	Season	Sound Level Meter and Serial Number
	Easting (meters)	Northing (meters)			
ML-1	693240	4802358	7449 Lake Road	Leaf-off	Larson Davis 831, S/N 10747
				Leaf-on	Larson Davis 831-C, S/N 11445
ML-2	694145	4801151	Hosmer Road and Haight Road	Leaf-off	Larson Davis 831, S/N 10756
				Leaf-on	Larson Davis 831-C, S/N 11471
ML-3	694630	4803220	Within existing Somerset Project Site bounds	Leaf-off	Larson Davis 831, S/N 10463
				Leaf-on	Larson Davis 831-C, S/N 11467
ML-4	695284	4802336	7830 Lake Road	Leaf-off	Larson Davis 831, S/N 10464
				Leaf-on	Larson Davis 831-C, S/N 10172
ML-5	696518	4802264	Lake Road and Hartland Road	Leaf-off	Larson Davis 831, S/N 10783
				Leaf-on	Larson Davis 831-C, S/N 11465
ML-6	696443	4803692	8398 Lower Lake Road	Leaf-off	Larson Davis 831, S/N 10747
				Leaf-on	

⁶ A-weighted sound level with the sound above the 1 kilo Hertz octave band removed

Table 7-6. Overall Pre-Construction Monitoring Summary – “Smart” ANS-Weighted

Sound Levels (dBA)												
Locati on	Overall				Day				Night			
	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On
	L _{eq}	L _{eq}	L ₉₀	L ₉₀	L _{eq}	L _{eq}	L ₉₀	L ₉₀	L _{eq}	L _{eq}	L ₉₀	L ₉₀
ML-1	57	46	57	36	59	49	60	39	55	41	53	25
ML-2*	--	--	53	29	--	--	56	33	--	--	47	21
ML-3	49	41	41	30	51	43	44	32	44	37	33	26
ML-4	62	40	59	40	64	42	62	44	60	37	55	22
ML-5*	--	--	62	37	--	--	65	40	--	--	58	22
ML-6	75	53	54	53	77	49	57	37	70	55	45	23

*Leaf-off measurements experienced meter failure at ML-2 and ML-5

dBA – A-weighted decibels; L_{eq} – energy-averaged sound level over a given measurement period

Table 7-7. Overall Pre-Construction Monitoring Summary – A-Weighted

Sound Levels (dBA)												
Location	Overall				Day				Night			
	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On	Leaf -Off	Leaf -On
	L _{eq}	L _{eq}	L ₉₀	L ₉₀	L _{eq}	L _{eq}	L ₉₀	L ₉₀	L _{eq}	L _{eq}	L ₉₀	L ₉₀
ML-1	60	48	59	38	61	50	61	42	57	41	54	27
ML-2*	--	--	54	34	--	--	57	37	--	--	48	24
ML-3	50	41	50	36	52	44	53	39	45	37	41	31
ML-4	64	41	60	43	66	42	63	46	61	38	56	25
ML-5*	--	--	64	43	--	--	66	46	--	--	59	28
ML-6	75	53	55	35	77	50	58	39	70	55	46	25

*Leaf-off measurements experienced meter failure at ML-2 and ML-5

dBA – A-weighted decibels; L_{eq} – energy-averaged sound level over a given measurement period

7(j) Evaluation of Future Noise Levels During Construction

Construction activities were broken out into four phases consisting of site preparation and grading, trenching and road construction, equipment installation, and commissioning. Phasing information and equipment source levels were provided by the Applicant. A total of 19 cumulative laydown areas also were assessed. In addition to general construction, horizontal directional drilling (HDD) activities also are proposed at 21 locations associated with sensitive electrical line crossings. The construction schedule and timeframe are not available at this time but the approach taken to assess construction noise is reasonable because it is conservative and assumes multiple phases of construction are ongoing at the same time in order to provide a “worst case” assessment.

Sound levels were calculated for each construction phase at all receptors. This calculation conservatively assumes that all equipment would be operating concurrently onsite for the specified construction phase and that there would be no sound attenuation for ground absorption or onsite shielding by the existing buildings or structures. Table 7-8 provides the results of the construction analysis at the 10 most impacted receptors, and Table 7-9 provides the results of the laydown area impacts at the 10 most impacted receptors. Resulting sound contour isopleths are provided in Appendix 7-A, Section 6.1, Figures 18 through 22.

Additionally, sound levels were calculated using the CadnaA® noise model for all receptors with all HDD construction occurring simultaneously. Table 7-10 provides the results of the HDD construction analysis, and Appendix 7-A, Section 6.1, Figure 23 shows the resulting sound contour isopleths. Assuming all HDD activities may occur simultaneously is conservative and presented for informational purposes only. As Facility design has progressed it is anticipated that, at most, only four HDD locations would be active at any given time; therefore, actual noise impacts during HDD activities will likely be substantially lower than those reported in this exhibit and Appendix 7-A.

Table 7-8. Summary of Construction Acoustic Modeling Results

Recept or ID	Participant Status	UTM Coordinates (meters)		Distance to Construction (feet)	Site Preparation and Grading (dBA)	Trenching and Road Construction (dBA)	Equipment Installation (dBA)	Commissioning (dBA)
		Easting	Northing					
163	Non-participating	695422	4802320	70	79	81	80	45
169	Non-participating	695773	4802305	270	77	79	78	43
165	Non-participating	695828	4802293	243	76	78	77	42
168	Non-participating	694465	4802311	177	75	77	76	41
166	Non-participating	694629	4802317	148	72	74	73	38
167	Non-participating	694630	4802264	320	72	74	73	38
172	Non-participating	693659	4802311	75	71	73	72	37
170	Non-participating	694188	4801897	410	70	72	71	36
164	Non-participating	694185	4801838	615	68	70	69	34
161	Non-participating	694222	4801768	490	67	69	68	33

dBA – A-weighted decibels

Table 7-9. Summary of Construction Laydown Acoustic Modeling Results

Receptor ID	Participant Status	UTM Coordinates (meters)		Distance to Nearest Laydown Area (feet)	Laydown Area (dBA)
		Easting	Northing		
163	Non-participating	695422	4802320	165	42
157	Non-participating	696524	4803758	230	41
148	Non-participating	694967	4801138	150	41
172	Non-participating	693659	4802311	180	40
170	Non-participating	694188	4801897	560	38
168	Non-participating	694465	4802311	790	37
164	Non-participating	694185	4801838	635	36
167	Non-participating	694630	4802264	275	36
166	Non-participating	694629	4802317	655	36
161	Non-participating	694222	4801768	580	35

dBA – A-weighted decibels

Table 7-10. Summary of HDD Construction Acoustic Modeling Results

Receptor ID	Participant Status	UTM Coordinates (meters)		Distance to HDD (feet)	Received Sound Level (dBA)
		Easting	Northing		
166	Non-participating	694629	4802317	197	79
172	Non-participating	693659	4802311	148	79
167	Non-participating	694630	4802264	351	76
168	Non-participating	694465	4802311	328	75
169	Non-participating	695773	4802305	377	74
165	Non-participating	695828	4802293	427	73
163	Non-participating	695422	4802320	591	71
170	Non-participating	694188	4801897	873	68
164	Non-participating	694185	4801838	1050	67
171	Participating	693296	4802429	1020	67

dBA – A-weighted decibels

Construction noise impacts are described in Appendix 7-A, Section 6.1. The maximum sound level at most impacted receptors that would occur from each activity is provided below. These levels are maximum levels from construction equipment operating simultaneously and will not be consistently experienced by nearby receptors.

- 79 dBA for site preparation and grading;
- 81 dBA for trenching and road construction;
- 80 dBA for equipment installation;
- 45 dBA for the commissioning;
- 42 dBA for the laydown areas;
- 79 dBA for HDD construction.

Construction noise will be temporary in nature, and as such, no long-term or significant noise impacts due to construction are anticipated. Reasonable efforts will be made to minimize potential effects from construction noise, such as:

- Construction equipment will be well-maintained and vehicles using internal combustion engines equipped with mufflers will be routinely checked to ensure they are in good working order;
- Portable noise barriers and enclosures will be used, when appropriate;
- Noisy equipment will be located as far from possible from sensitive areas; and
- A Complaint Management Plan will be developed and approved by ORES prior to initiating construction of the Facility, and this plan will include a hotline number that will be made available to address any noise-related issues.

7(k) Sound Levels in Graphical Format

Sound level contours of the noise impacts are provided in Appendix 7-A, Section 6, Figures 18 through 27. Sound level contours of the mitigated noise impacts also are provided in Figure 7-1 for full operational mitigated sound levels and Figure 7-2 for Facility Substation-only mitigated sound levels. These exhibit figures also are being provided as separate full-size (22" x 34") hard copies as required; and identify the boundary lines differentiating participating and non-participating landowners. Appendix 7-A, Figures 25 and 27 provide more detailed views of the information provided in Figure 7-1 and Figure 7-2.

7(I) Sound Levels in Tabular Format

A tabular comparison between the maximum sound impacts and any design goals, noise limits, and local requirements for the Facility, and the degree of compliance at all sensitive sound receptors and at the most impacted portions of non-participating properties within the Facility Site is provided in Appendix 7-A, Attachment 1. The tabulated noise modeling results shows no receptors will experience mitigated operational noise levels from the Facility above 45 dBA for full Facility operations or above 40 dBA for Facility Substation-only operations.

(1) All sources running--inverters plus the Facility Substation (collector substation)

Future L_{eq} (8-hour) sound levels during worst-case operation of the Facility's inverters plus the Facility Substation have been calculated using the methodology described above. Appendix 7-A, Attachment 1 provides the predicted dBA and full octave band frequency (31.5 Hz to 8,000 Hz) sound pressure levels at all sensitive receptors. The results are sorted by receptor ID and sorted by A-weighted sound level high to low, and then are broken down by receptor type (Residential and Public) and participation (Non-Participating and Participating). Appendix 7-A, Attachment 1, Table A-1 provides the received sound levels from unmitigated full operations and Table A-2 provides the received sound levels from mitigated full operations.

The highest sound levels at residential receptors under the mitigated scenario are:

- Non-participating receptor = 40 dBA
- Participating receptor = 42 dBA

These sound levels are below the design goals of 45 dBA for a non-participating residence and 55 dBA for a participating residence, and also meet the adjusted design goal at the non-participating residences due to the observed prominent tone and subsequent 5 dBA penalty. Thus, the Facility complies with these design goals.

Mitigated full operation sound level contours generated from the modeling grid are presented in Appendix 7-A, Figure 25. As Figure 25 shows, sound levels will be below the design goal of 55 dBA at all non-participating property lines. The highest mitigated sound level due to the Facility at a non-participating property line occurs on Parcel Tax-ID: 8.00-1-31.22, near Inverter 1 in Area 5. This property line boundary is predicted to be 43 dBA.

(2) Facility Substation (Collector Substation) only

Future L_{eq} (1-hour) sound levels during worst-case operation of the Facility Substation (collector substation)-only have been calculated using the methodology described above. Appendix 7-A provides the predicted A-weighted (dBA) and full octave band frequency (31.5 Hz to 8,000 Hz) sound pressure levels at all residences. The results are sorted by receptor ID and sorted by A-weighted sound level from high to low for all Non-Participating residences. Within Appendix 7-A, Table A-3 provides the received sound levels for unmitigated Facility Substation-only operations, and Table A-4 provides the received sound levels for mitigated Facility Substation-only operations. Mitigated Sound level contours from the Facility Substation generated from the modeling grid are presented in Appendix 7-A, Figure 27.

The highest mitigated sound level under this scenario is 35 dBA at a non-participating residence. This sound level meets the design goal of 35 dBA, assuming the 5 dBA tonal penalty.

(3) Local Requirements

The Town regulates noise through its Codes, specifically Chapter 131 Noise. This chapter states that no person shall cause or permit to be caused by any means:

- A. Sound which causes the sound level to exceed 80 dBA between the hours of 7:00 a.m. and 11:00 p.m., nor 50 dBA between the hours of 11:00 p.m. and 7:00 a.m. on any property being used for residential purposes (other than the premises from which the sound emanates), including both the residence and the real property outside of the residence and forming a part of the residential property.
- B. The use of any sound-emitting device inside or outside or a structure whereby the sound emitted from such device is audible on property being used for residential purposes at a point more than 100 feet from the real property boundary line of the property from which said sound emanates.
- C. The use or operation of any sound-producing device, or the production of sound by any other means, within 500 feet of any school, church, synagogue, mosque, temple or courthouse while the same is in session, or within 500 feet of any hospital, nursing home or medical facility at any time, when such sound would disturb a reasonable person of normal auditory sensitivities present in such structure or facility, provided that conspicuous signs are displayed indicating the location of such facility.

- D. The outdoor use or operation of any powered tool or equipment, including but not limited to saws, sanders, drills, grinders, lawn mowers or tractors, leaf blowers, or any other garden tools or equipment, audible on property being used for residential purposes between the hours of 11:00 p.m. and 7:00 a.m. of the following day, so as to disturb the quiet, comfort or repose of a reasonable person of normal auditory sensitivities.
- E. The operation of any motor vehicle with a gross vehicle weight rating in excess of 10,000 pounds, or any auxiliary equipment attached to such motor vehicle, for a period longer than 15 minutes in any hour while the vehicle is stationary for reasons other than traffic congestion, so that the sound emanated therefrom is audible on property being used for residential purposes between the hours of 11:00 p.m. and 7:00 a.m. of the following day.
- F. The conduct of any construction activities, including but not limited to the erection, demolition, assembling, altering, installing or equipping of buildings, public or private roadways, roads, parks, utility lines or other property, including related activities such as land clearing, grading, earthmoving, excavating, blasting, filling or landscaping, so as to project a noise therefrom so as to disturb the quiet comfort or repose of a reasonable person of normal auditory sensitivities on property being used for residential purposes between the hours of 11:00 p.m. and 7:00 a.m. of the following day.

Construction activities will comply with the above local requirements as Chapter 131-4(G) goes on to exempt the noise requirements for construction activity between the hours of 7:00 a.m. and 11:00 p.m. Construction activities for the Facility will only occur between the hours of 7:00 a.m. and 11:00 p.m.

Facility operations will comply with Chapter 131-3(A) as Appendix 7-A, Attachment 1 shows the received noise levels will be below 80 dBA between the hours of 7:00 a.m. and 11:00 p.m., and 50 dBA between the hours of 11:00 p.m. and 7:00 a.m. Chapter 131-3(B) is not applicable to the Facility and to the extent that the Town considers it applicable; the Applicant is seeking a waiver of its application to the Facility. More details with respect to the waiver request are provided in Exhibit 24. Facility operations will be in compliance with Chapter 131-3(C) as there is no school, church, synagogue, mosque, temple, courthouse, nursing home, or medical facility within 500 feet of a Facility noise source. Facility operations will comply with Chapter 131-3(D) and Chapter 131-(E) as operations are not expected to include the outdoor use or operation of any powered tool or equipment, including but not limited to saws, sanders, drills, grinders, lawn mowers or tractors, leaf blowers, or any other garden tools or equipment, or the operation of any motor vehicle with a gross vehicle weight rating in excess of 10,000 pounds.

The Town Code also specifically regulates noise from solar operations in Section 205-110 (Solar Law). Permitting Requirements for Tier 3 Solar Energy Systems. Section 205-110(3)(h) states:

Noise. The project shall be shown to not have adverse or unreasonable noise impacts on surrounding homes or other sensitive receptors. The one-hour average noise generated from the solar energy system's components and associated ancillary equipment shall not exceed a noise level, as measured at the outside wall of **any non-participating residence or occupied community building, based on current (45 dBA)** or future recommendations from World Health Organization. Applicants may submit equipment and component manufacturers' noise ratings to demonstrate compliance. The applicant may be required to provide operating sound pressure level measurements from a reasonable number of sampled locations at the perimeter of the solar energy system to demonstrate compliance with this standard.

The Facility will comply with the Town Solar Law since received noise levels from operations will not exceed 45 dBA at any non-participating residences or occupied community building, as shown in Appendix 7-A, Attachment 1.

In summary, the Town presents noise requirements that are relevant to Facility construction and operation; however, regarding operations, the §94-c requirements would be considered the most stringent due to their decibel limits and tonal penalty. Furthermore applying the §94-c requirements demonstrates, through modeling, how the §94-c requirements comply with the local law.

7(m) Community Noise Impacts

(1) Hearing Loss for the Public

The Facility's potential to result in hearing loss to the public was evaluated against the 1999 "Guidelines for Community Noise" published by the World Health Organization (WHO). According to the WHO Guidelines, the threshold for hearing impairment is 70 dBA L_{eq} (24-hour), 110 dBA (L_{max} , fast) or 120/140 dBA (peak at the ear) for children/adults. Operational noise will always be less than 55 dBA L_{eq} (8-hour) at any residence. This is well below the 70 dBA limit. The only construction noise source for this Facility capable of exceeding the WHO hearing impairment threshold is blasting; however, no blasting is anticipated to be required for this Facility. All other construction activities will produce noise below the WHO hearing impairment threshold. Therefore, no Facility activities have the potential to cause hearing loss to the public.

(2) Potential for Structural Damage

As described in Exhibit 10, blasting is not anticipated to be required for construction of the Facility. If blasting becomes necessary, this exhibit and Exhibit 10 would be updated to provide a detailed discussion of the potential to produce structural damage on any existing proximal buildings.

7(n) Noise Abatement Measures for Construction Activities

The following best management construction practices are recommended to limit construction hours and reduce construction noise levels at noise sensitive locations:

- Construction equipment will be well-maintained and vehicles using internal combustion engines equipped with mufflers will be routinely checked to ensure they are in good working order;
- Racking post-installation and HDD activities will be limited to daytime hours;
- Pursuant to 19 NYCRR §6.2(k)(1), construction equipment will be fitted with exhaust systems and mufflers that have the lowest associated noise whenever those features are available and, maintain functioning mufflers on all transportation and construction machinery;
- Use of back-up alarms with a minimum increment above the background noise level to satisfy the performance requirements of the current revisions of Standard Automotive Engineering J994 and Occupational Safety and Health Administration requirements;
- Portable noise barriers and enclosures will be used, when appropriate;
- Noisy equipment will be located as far from possible from sensitive areas;
- To minimize noise impacts during construction, the Applicant will comply with 19 NYCRR §6.2(k)(2), which includes responding to noise and vibration complaints according to the complaint resolution protocol approved by the Office of Renewable Energy Siting. The Applicant will prepare a Complaint Management Plan, which will be approved by prior to initiation of construction activities as a required compliance filing. The Complaint Management Plan will include a noise complaint hotline, which will be available during the construction (and operation) period to address any noise-related issues; and
- In accordance with 19 NYCRR §6.2(a), (c) and (d), the Applicant will provide notice of commencement of construction and completion of construction to residences located on adjacent parcels. The notice will include the procedure and contact information for registering a complaint.

A batch plant is not proposed; and no blasting is proposed for construction of the Facility. The Town exempts construction noise from 7:00 a.m. until 11:00 p.m. through Chapter 131(I):

- I. The conduct of any construction activities, including but not limited to the erection, demolition, assembling, altering, installing or equipping of buildings, public or private roadways, roads, parks, utility lines or other property, including related activities such as land clearing, grading, earthmoving, excavating, blasting, filling or landscaping, so as to project a noise therefrom so as to disturb the quiet comfort or repose of a reasonable person of normal auditory sensitivities on property being used for residential purposes between the hours of 11:00 p.m. and 7:00 a.m. of the following day.*

7(o) Noise Abatement Measures for Facility Design and Operation

Adverse noise impacts have been avoided and minimized through careful siting of Facility components and incorporation of appropriate noise mitigation barriers in select locations. The noise emitted by a solar project is limited to daylight periods only for the majority of the components. For the Facility to be in compliance, a noise barrier that is 28 feet high and 43 feet in length will be constructed 10 feet south of the Facility Substation transformer (Appendix 5-B, Sheets HV-P01.01, HV-P02.01 and HV-P02.02). In addition, two barriers that are 16 feet high and 100 feet in length will be constructed approximately 10 feet to the east of the two inverter skids in Area 5 of the Facility Site (Appendix 5-A, Sheet PV-C.02.05). The Facility Substation transformer noise barrier will be constructed of materials that have a minimum surface weight of 4 pounds per square foot. Examples of materials that would meet these requirements include poured concrete, concrete panels, concrete masonry blocks, including “acoustical” block, or metal panels, including “acoustical” panels. The two noise barriers in Area 5 will be constructed of a product similar to Acustifence from Acustiblok and has a sound transmission class rating of 28⁷. The locations of the noise barriers are shown in Figures 7-1 and 7-2. Information for the proposed acoustical fencing for Area 5 is provided in Appendix 7-E, Attachment 5.

7(p) Software Input Parameters, Assumptions, and Associated Data for Computer Noise Modeling

Software input parameters, assumptions, and associated data used for the computer modeling has been provided as follows:

⁷ The sound transmission class is a single number method of rating how well wall partitions reduce sound transmission.

- 1) GIS files used for the computer noise modeling, including noise source and receptor locations and heights, topography, boundary lines, and participating status has been delivered by digital means.
- 2) Computer noise modeling files have been submitted by digital/electronic means as part of this Application.
- 3) Site plan and elevation details of the Facility Substation, as related to the location of all relevant noise sources (e.g., transformer, HVAC), is included in Appendix 7-A, Figure 26 and Figure 27. No energy storage systems are proposed for the Facility so this information is not included on the site plans or elevation details.
- 4) Applicable only to wind facilities.
- 5) The Application contains:
 - a. The locations of all noise sources (e.g., substation transformer, medium to low voltage transformers, inverters, HVAC equipment, tracker motors) are provided in the GIS files required and described in section (7)(p)(1) above as well as in Appendix 7, Attachment 3.
 - b. Sound information from the manufacturers for all noise sources as listed above has been provided as follows:
 - i. The sound data for the inverters was obtained from the manufacturer and is included in Appendix 7-A, Table 21. As the Applicant has not procured the Facility Substation transformer at the time this Application was submitted, conservative sound modeling was completed for the Facility Substation transformer, based on National Electrical Manufacturer Association TR-1 sound levels normalized to the specific dimensions of the transformer. Sound specifications for the operating equipment are given in Appendix 7-A, Attachment 4
 - ii. The PNIA includes a 5-dBA penalty applied to the Facility Substation transformer, which has been applied to all full-octave band sound power levels, as explained in Appendix 7-A, Section 5.2.

7(q) Miscellaneous

A glossary of terminology, definitions, abbreviations are provided in Appendix 7-A, Section 2. There were no sensitive sound receptors identified that will be exposed to noise levels that exceed any design goals or noise limit under mitigated conditions.

References

American National Standard ANSI S12.9-2013/Part 3 (R2018). 2013. Quantities and Procedures for Description and Measurement of Environmental Sound. Part 3: Short-term Measurement with an Observer Present.

Edison Electric Institute. 1983. Electric Power Plant Environmental Noise Guide (Volume 1, 2nd edition, Report 3637. 1983 Update). Prepared by Bolt Beranek and Newman Inc.

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World Health Organization (WHO). 1999. Guidelines for Community Noise. 161 pp. Available online at: [Guidelines for community noise \(who.int\)](https://www.who.int/publications/i/item/928910224). Accessed July 18, 2022.