North Seneca Solar Project

ORES Permit Application No. 23-00036

1100-2.8 Exhibit 7

Noise and Vibration

REVISION 1

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EXHIBIT 7 NOISE AND VIBRATION

(a) Noise Impacts Study

North Seneca Solar Project, LLC (the Applicant) proposes to construct and operate the North Seneca Solar Project (the Facility), an up to 90-megawatt commercial photovoltaic (PV) energy system located in the Towns of Waterloo and Junius, Seneca County, New York. The Applicant requested that Epsilon Associates, Inc. (Epsilon) complete a detailed analysis of the potential sound impacts associated with the construction and operation of the Facility, which is outlined in this exhibit. Exhibit 7 was prepared by Mr. Ryan Callahan of Epsilon. Mr. Callahan has over eighteen years of experience in the areas of community noise impacts, sound level data collection, and analyses. He is a full member of the Institute of Noise Control Engineering (INCE). The modeling performed by Epsilon for the Facility is sufficiently conservative in predicting sound impacts, and includes all proposed inverters and the substation operating at their maximum capacities.

(b) Design Goals

The design goals for this solar facility are described below.

i) A maximum noise limit of forty-five (45) broadband overall (dBA) Equivalent Continuous Sound Level ($L_{eq)}$ (8-hour), at the outside of any existing non-participating residence, and fifty-five (55) dBA L_{eq} (8-hour) at the outside of any existing participating residence. The Facility meets these limits as discussed in Section 7(l).

ii) A maximum noise limit of forty (40) dBA L_{eq} (1-hour) at the outside of any existing non-participating residence from the collector substation equipment. The Facility meets these limits as discussed in Section 7(l).

iii) A prohibition on producing any audible prominent tones, as defined by using the constant level differences listed under American National Standards Institute (ANSI) S12.9-2005/Part 4 Annex C (sounds with tonal content), at the outside of any existing non-participating residence. Should a prominent tone occur, the dBA noise level at the evaluated non-participating position shall be increased by 5 dBA for evaluation of compliance with subparagraph (i) and (ii) of this paragraph. The inverter currently under consideration for this Facility does not have available one-third octave band sound level data, and so is assumed to have a prominent tone. Even with the 5 dBA penalty, the Facility meets these limits as discussed in Section 7(e).

iv) A maximum noise limit of fifty-five (55) dBA L_{eq} (8-hour), short-term equivalent continuous average sound level from the Facility across any portion of a non-participating property except for portions delineated as NYS-regulated wetlands pursuant to section 1100-1.3(e) of this Part and utility right-of-way (ROW) to be demonstrated with modeled sound contours drawings and discrete sound levels at worst-case locations. No penalties for prominent tones will be added in this assessment. The Facility meets these limits as discussed in Sections 7(k) and 7(l).

There are no applicable sound level requirements in the Towns of Junius or Waterloo.

(c) Radius of Evaluation

All sensitive receptors within at least a one thousand five hundred (1,500) foot radius from any noise source (e.g., substation transformer(s), inverters) proposed for the Facility or within the thirty (30) dBA noise contour, whichever is greater, were included in the analysis. Each of these sensitive receptors are visible in Figure 7-1.

A cumulative analysis requires noise modeling to include any solar facility and substation, existing and proposed, by the time of filing the application, and any existing sensitive receptors within a 3,000-foot radius from any noise source proposed for this Facility, or within the 30 dBA noise contour, whichever is greater. There are no other solar facilities within 3,000 feet of Facility noise source or within the 30 dBA contour; therefore, no cumulative analysis is required.

(d) Modeling Standards, Input Parameters, and Assumptions

(1) Maximum Sound Pressure Levels at Sensitive Sound Receptors

Future sound levels associated with the Facility were predicted using the CadnaA noise calculation software developed by DataKustik GmbH. This software implements the ISO 9613-2 international standard for sound propagation (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation) for full octave bands from 31.5 Hertz (Hz) to 8000 Hz. As per International Organization for Standardization (ISO) 9613-2, all calculations assumed favorable conditions for sound propagation, corresponding to a moderate, well-developed ground-based temperature inversion, as might occur on a calm, clear night or equivalently downwind propagation. In addition, the ISO 9613-2 standard assumes all receptors are downwind of every sound source simultaneously. No meteorological correction (Cmet) was added to the results, pursuant to 16 NYCRR Section 1100-2.8(d).

Elevation contours for the modeling domain were directly imported into CadnaA which allowed for consideration of terrain shielding where appropriate. The terrain height contour elevations for the modeling domain were generated from elevation information derived from the National Elevation Dataset (NED) developed by the U.S. Geological Survey.

All sound sources were assumed to be operating simultaneously at maximum sound power levels. The collector substation was also modeled by itself operating at maximum sound power level.

The sound power levels for each source used in the modeling are discussed below.

Inverters

The sound level analysis includes 24 inverters as provided to Epsilon by the Applicant. The source location coordinates, ground elevations, and heights above ground are summarized in Appendix 7-1. One inverter manufacturer (Sungrow) was evaluated for this analysis. All 24 of the proposed inverters will be Sungrow inverters with identical specifications. The inverter manufacturer, power ratings, and dimensions examined for this assessment are presented below in Table 7-1.

Table 7-1 Power Inverter Analyzed for Sound Level Assessment

Manufacturer	Inverter Model	Maximum Electrical Output [kVA]	Dimensions [WxHxD] [m]
Sungrow	SG4400UD	4,400	6.1x2.9x2.4

Broadband and whole octave band sound power levels for the Sungrow inverter operating under typical (daylight) conditions were provided by the Applicant[1]. The octave band sound power levels are presented in Table 7-2.

Table 7-2 Inverter Octave Band Sound Power Levels

Inverter Type	Broadband Sound Power Level [dBA]	Sound Power Levels per Octave-Band Center Frequency[1] [Hz]								
		31.5	63	125	250	500	1k	2k	4k	8k
		dB	dB	dB	dB	dB	dB	dB	dB	dB
SG4400UD	91	90	89	87	83	86	84	87	77	55

1. Octave band sound powers were scaled to match reported broadband sound power

Collector Substation

In addition to the inverters, there will be a collector substation located within the Facility Site. The modeling inputs of the transformer – coordinates, ground elevation, and height above ground are summarized in Appendix 7-1. A step-up transformer rated at up to 109 MVA with a National Electrical Manufacturers Association (NEMA) sound rating of 81 dBA is proposed for the collector substation. Epsilon estimated octave band sound level emissions using the techniques in the Electric Power Plant Environmental Noise Guide, Table 4.5 Sound Power Levels of Transformers. Table 7-3 summarizes the sound power level data used in the modeling.

Table 7-3 Collector Substation Transformer Sound Power Levels—per unit

Maximum Rating [MVA]	Broadband Sound Power Level [dBA]	Sound Power Levels per Octave-Band Center Frequency [Hz]								
		31.5	63	125	250	500	1k	2k	4k	8k
		dB	dB	dB	dB	dB	dB	dB	dB	dB
109	100	97	103	105	100	100	94	89	84	77

i) For all modeling scenarios, the ground absorption factor (G) was set to 0.5 for the ground and 0 for water bodies.

ii) A temperature of 10 degrees Celsius and 70% relative humidity was used to calculate atmospheric absorption for the ISO 9613-2 model. These parameters were selected to minimize atmospheric attenuation in the 500 Hz and 1000 Hz octave bands where the human ear is most sensitive, and thus provide conservative results.

iii) For all modeling scenarios, the CadnaA model used a one and a half (1.5) meter assessment point above the ground. No uncertainty factor was added to the modeled results.

The maximum A-weighted dBA L_{eq} (1-hour or 8-hour) sound pressure levels, and the maximum linear/unweighted/Z dB (L_{eq} 1-hour) sound pressure levels from the thirty-one and a half (31.5) Hz up to the eight thousand (8,000) Hz full-octave band, at all sensitive sound receptors within the radius of evaluation are discussed and presented in Section 7(l).

[1] Sungrow Noise Test Report for SG4400UD, November 17, 2023.

(2) Maximum Sound Pressure Levels at Facility Property Boundaries

In addition to modeling at discrete points, sound levels were also modeled throughout a large grid of receptor points, each spaced 10 meters apart to allow for the generation of sound level isolines. Tabular results and sound level isolines were calculated and generated for the entire study area.

The maximum A-weighted dBA Leq sound pressure levels (Leq (8-hour)) at the most critically impacted external property boundary lines of the Facility Site (e.g., non-participating boundary lines) are shown in Figure 7-4.1.

(3) Summary of Receptors Exposed to Sound Levels Greater than 35 dBA

A summary of the number of receptors exposed to sound levels greater than thirty-five (35) dBA are shown in Table 7-4 grouped in one (1)-dBA bins.

Table 7-4 Receptors Modeled at 35 dBA or Greater – Unmitigated Total Sound L_{eq} (8-hour)

Modeled Leq Sound Level [dBA]	# of Receptors										
	Residence		Historic	Public	Utility	Other		Uninhabitable Structure		Commercial	
	Participating	Non-Participating	Non-Participating	Non-Participating	Non-Participating	Participating	Non-Participating	Non-Participating	Participating	Participating	Non-Participating
40	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0
38	1	1	0	0	0	0	1	0	0	0	0
37	0	1	0	0	0	2	2	0	0	1	1
36	0	5	0	0	0	0	4	0	0	0	1
35	0	2	0	0	0	1	7	0	0	0	0

(4) Noise Impacts with Sound Level Contours

Sound level contours as specified in 16 NYCRR Section 1100-2.8(k) are shown in Figure 7-4.1.

(e) Evaluation of Prominent Tones for Design

ANSI/ASA S12.9-2013 Part 3, Annex B, section B.1 (informative) presents a procedure for testing for the presence of a prominent discrete tone. According to the standard, a prominent discrete tone is identified as present if the time-average sound pressure level in the one-third octave band of interest exceeds the arithmetic average of the time-average sound pressure level for the two adjacent one-third octave bands by any of the following constant level differences:

- 15 dB in low-frequency one-third-octave bands (from 25 up to 125 Hz);
- 8 dB in middle-frequency one-third-octave bands (from 160 up to 400 Hz); or,
- 5 dB in high-frequency one-third-octave bands (from 500 up to 10,000 Hz).

(1) Sound pressure level calculations using the CadnaA modeling software which incorporates the ISO 9613-2:1996 propagation standard is limited to octave band sound levels; therefore, a quantitative evaluation of one-third octave band sound levels using the modeling software was not possible. Additionally, the sound level data provided by the Applicant from the manufacturer does not contain one-third octave band sound power levels; therefore, a quantitative evaluation of one-third octave band sound using a spreadsheet modeling approach was not possible. For this reason, the inverter was assumed to be tonal and prominent by default. Due to this prominent tone, a 5 dBA penalty has been applied on a short term broadband basis to non-participating residential receptors. Even with the broadband penalty, short term broadband sound pressure levels comply with the 45 dBA limit at all non-participating residences.

(2) One-third octave band sound power levels for the collector substation transformer were not supplied by the vendor for the substation equipment; therefore, a quantitative evaluation of one-third octave band sound using a spreadsheet modeling approach was not possible. For this reason, the substation transformer was assumed to be tonal and prominent by default.

(f) Evaluation of Low Frequency Noise for Wind Facilities

The proposed Facility is not a wind facility; therefore, the requirements of Section 1100-2.7(f) are not applicable.

(g) Evaluation of Infrasound for Wind Facilities

The proposed Facility is not a wind facility; therefore, the requirements of Section 1100-2.7(g) are not applicable.

(h) Map of Study Area

Figure 7-1 is a map of the sound study area showing the location of sensitive sound receptors in relation to the Facility (including the collector substation and the point of interconnect).

(1) In total, 865 discrete receptors were analyzed for the Facility. These include 456 residential receptors, two (2) historic receptors, fifty-one (51) commercial receptors, ten (10) public and utility receptors, and 346 other receptors. Of the 865 receptors, eight (8) were participating, and 857 were

non-participating, as defined in Section 7(h)(3) below. Of the 456 residential receptors, two (2) were participating and 454 were non-participating. Of the two (2) historic receptors, zero (0) were participating and two (2) were non-participating. Of the fifty-one (51) commercial receptors, one (1) was participating and fifty (50) were non-participating. Of the ten (10) public and utility receptors, zero (0) were participating and ten (10) were non-participating. Of the 346 other receptors, five (5) were participating and 341 were non-participating. A detailed listing of all receptors including receptor ID, latitude/longitude, elevation, participation status, and receptor category is included as Appendix 7-2.

(2) All residences were included as sensitive sound receptors regardless of participation status (e.g., participating, potentially participating, and non-participating residences) or occupancy (e.g., year-round, seasonal use)

(3) Only properties that have a signed easement, lease option or purchase option with the Applicant prior to the date of filing the application were identified as "participating." Other properties were designated as "non-participating."

(i) Ambient Pre-Construction Baseline Noise Conditions

An evaluation of ambient pre-construction baseline noise conditions was conducted for nine (9) days by using the L_{90} statistical and the L_{eq} energy based noise descriptors, and by following the recommendations included in ANSI/ASA S3/SC 1.100-2014-ANSI/ASA S12.100-2014 American National Standard entitled Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas. The full details of the ambient pre-construction sound level measurement program are found in Appendix 7-3.

(j) Construction Noise

(1) Future construction noise modeling was performed for the main phases of construction and from activities at the proposed laydown area using the ISO 9613-2:1996 sound propagation standard as implemented in the CadnaA software package. Reference sound source information was obtained from either Epsilon's consulting files or the FHWA's Roadway Construction Noise Model (RCNM).

(2) The majority of the construction activity will occur around each of the inverter locations, at the location of the collector substation, at each of the solar arrays, and at the locations where Horizontal Directional Drilling (HDD) will occur. There is no concrete batch plant proposed for construction of the Facility. By its very nature, construction activity moves around the Facility Site. Full construction activity will generally occur at one location at a time, although there will be some overlap at adjacent construction locations for maximum efficiency. For modeling conservatism, it was assumed that full activity was occurring at the closest locations to their surrounding receptors. There are generally five phases of construction for a solar energy project – site preparation and grading, trenching and road construction, HDD, equipment installation, and commissioning. Table 7-5 presents the equipment sound levels for the louder pieces of construction equipment expected to be used at this site along with their phase of construction.

Table 7-5 Sound Levels for Noise Sources Included in Construction Modeling

Phase	Equipment	Sound Level at 50 feet [dBA]
Site Preparation & Grading	Grader (174 hp)	85
Site Preparation & Grading	Rubber Tired Loader (164 hp)	85
Site Preparation & Grading	Scraper (313 hp)	89
Site Preparation & Grading	Water Truck (189 hp)	80
Site Preparation & Grading	Generator Set	81
Trenching & Road Construction	(2) Excavator (168 hp)	85
Trenching & Road Construction	Bar Trencher (600 hp)	89
Trenching & Road Construction	Grader (174 hp)	85
Trenching & Road Construction	Water Truck (189 hp)	80
Trenching & Road Construction	Trencher (63 hp)	83
Trenching & Road Construction	Rubber Tired Loader (164 hp)	85
Trenching & Road Construction	Generator Set	81
Equipment Installation	Crane (399 hp)	83
Equipment Installation	Crane (165 hp)	83
Equipment Installation	(2) Forklift (145 hp)	85
Equipment Installation	(2) Vermeer PD10 Pile Driver	84
Equipment Installation	(6) Pickup Truck/ATV	55
Equipment Installation	(2) Water Truck (189 hp)	80
Equipment Installation	(2) Generator Set	81
HDD Entry	Excavator (168 hp)	85
HDD Entry	Auger Drill Rig	85
HDD Entry	Pickup Truck/ATV	55
Commissioning	(2) Pickup Truck/ATV	55

(3) The operational modeling requirements included Sections 7(d)(1)(i) through 7(d)(1)(iii) of this Exhibit were also used for modeling of construction noise.

(4) Worst-case sound levels from construction activity are shown using sound level contours in Figure 7-j.1 and sound levels at the most critically impacted receptors are shown in Appendix 7-4.

Construction sound levels at all residential receptors have been calculated. The results are shown as maximum 1-second L_{eq} sound levels with all pieces of equipment for each phase operating at the locations. These results overstate expected real-world results, because under actual construction conditions, not all pieces of equipment will be operating at the same exact time, and the highest sound levels from every piece of equipment will not tend to occur at the same time as was assumed in the modeling. Additionally, sound levels were modeled in the vicinity of the closest HDD entry point to a receptor. Modeling assumed simultaneous construction activity at this HDD entry point. HDD work and commissioning work was modeled at this HDD entry point.

Construction Modeling Results

The cumulative impacts from site preparation and grading work, trenching and road construction work, equipment installation (pile driving, tracker installation work, module installation work), commissioning work, and HDD was calculated with the CadnaA model for all receptors. The loudest phase of construction will be equipment installation work. A sound contour figure of equipment installation work occurring simultaneously across the Facility Site is presented in Figure 7-j.1.

The highest sound level at a non-participating receptor is 71 dBA during site preparation and grading (Receptor #625), 73 dBA during trenching and road construction (Receptor #625), 73 dBA during equipment installation (Receptor #625), and 38 dBA during commissioning (Receptor #625). Modeling results of construction sound levels for the ten (10) closest receptors to any construction work are shown in Table 7-6 and results for all receptors are summarized in Appendix 7-4.

Table 7-6 Construction Sound Levels for Nearest Receptors – L_{eq} (1-second)

Receptor ID	Distance (m)	Participation Status	Site Preparation & Grading	Trenching & Road Construction	Equipment Installation	Commissioning	Worst-Case Total
625	69	Non-Participating	71	73	73	38	77
626	71	Non-Participating	71	73	72	37	77
348	75	Non-Participating	54	56	55	20	60
668	82	Non-Participating	63	65	65	29	69
339	86	Non-Participating	57	59	58	23	63
620	89	Non-Participating	65	66	66	31	71
352	95	Non-Participating	53	55	54	19	59
777	96	Non-Participating	59	60	60	25	64
350	102	Non-Participating	57	59	58	23	63
645	106	Non-Participating	59	60	60	25	65

The cumulative impacts from HDD work and commissioning work were calculated with the CadnaA model for the ten closest receptors to construction activities. The loudest phase of construction within this area will be HDD work. A sound contour figure of HDD work occurring at the HDD entry point is presented in Figure 7-j.2.

The highest sound level at a non-participating receptor is 71 dBA during the HDD (Receptor #693) and 41 dBA during the commissioning (Receptor #693). Modeling results of the construction sound levels within this area are summarized in Table 7-7.

Table 7-7 Construction Sound Levels for Nearest Receptors, HDD – L_{eq} (1-second)

Receptor ID	Distance (m)	Participation Status	HDD	Commissioning	Worst-Case Total
693	52	Non-Participating	71	41	71
692	86	Non-Participating	66	36	66
691	101	Non-Participating	65	34	65
689	116	Non-Participating	63	33	63
690	129	Non-Participating	62	32	62
688	200	Non-Participating	59	28	59
687	239	Non-Participating	57	27	57
824	241	Non-Participating	57	27	57
855	264	Non-Participating	56	26	56
686	282	Non-Participating	56	26	56

Construction Noise Conclusions

Noise due to construction is an unavoidable outcome of construction. The five major construction phases for this are: site preparation and grading, trenching and road construction, HDD, equipment installation (pile driving, tracker installation, module installation), and commissioning. Most of the construction will occur at significant distances from sensitive receptors, and therefore noise from most phases of construction is not expected to result in impacts to sensitive receptors. Construction noise will be minimized through the use of best management practices (BMP). Additional details of the BMPs and of the complaint resolution plan are provided in section (n) below.

(k) Sound Levels in Graphical Format

(1) Figure 7-4.1 presents future L_{eq} (8-hour) sound contour lines showing expected sound levels during worst-case operation of the Facility's inverters plus the collector substation for the mitigated scenario using the methodology described above. Figure 7-5.1 presents future L_{eq} (1-hour) sound contour drawings showing expected sound levels during worst-case operation of the Facility's collector substation-only using the methodology described above.

(2) The sound contour maps include all sensitive sound receptors, boundary lines (differentiating participating and non-participating), and all Facility noise sources.

(3) Sound contours are rendered until the thirty (30) dBA noise contour is reached, in one (1)-dBA steps, with sound contour multiples of five (5) dBA differentiated.

(4) Full-size hard copy maps (22" x 34") of these figures in 1:12,000 scale will be submitted to the Office of Renewable Energy Siting (ORES) with the Application.

(l) Maximum Sound Impacts

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 non-participating boundary lines within the Study Area is presented below.

<u>All sources operating – inverters plus the collector substation</u>

Future L_{eq} (8-hour) sound levels during worst-case operation of the Facility's inverters plus the collector substation have been calculated using the methodology described above. Appendix 7-5 provides the predicted A-weighted (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, Public and School) and participation (Non-Participating and Participating). In total, there are sixteen tables from Table 7-5.1a to Table 7-5.1p.

The highest sound levels at residential receptors are:

- Non-participating receptor = 38 dBA
- Participating receptor = 38 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 assumed prominent tone and subsequent 5 dBA penalty. Thus, the Facility complies with these design goals.

Sound level contours generated from the modeling grid are presented in an overview figure, (Figure 7-4.1), accompanied by a series of inset maps that provide a higher level of detail at all modeled receptors. As these figures show, sound levels will be below the design goal of 55 dBA at all non-participating property lines that are not utility ROWs. The highest sound level due to the Facility at a non-participating property line occurs on Parcel ID: 14-1-24, near Inverter 7. The Facility only sound level at this property line boundary is predicted to be 44 dBA.

<u>Collector substation only</u>

Future L_{eq} (1-hour) sound levels during worst-case operation of the Facility's collector substation only both with and without mitigation have been calculated using the methodology described above. Appendix 7-6 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 residences. In total, there are four tables from Table 7-6.1a to 7-6.1d showing the results found in Appendix 7-6. Sound level contours from the collector substation generated from the modeling grid are presented in Figure 7-5.1.

The highest sound level under this scenario is 35 dBA at a non-participating residence. This sound level meets the design goal of 40 dBA, after applying the 5 dBA tonal penalty, which is assumed for a substation transformer.

<u>Local Requirements</u>

There are no applicable sound level requirements in the Towns of Junius and Waterloo.

(m) Potential Community Noise Impacts

(1) Potential for Hearing Damage

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 (Lmax, 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. No blasting is anticipated for this Facility and all construction activities will produce noise below the WHO hearing Lmax impairment threshold. All construction activities will produce noise below the 70 dBA L_{eq} (24-hour) impairment threshold as construction will not occur continuously 24 hours/day. Therefore, no Facility activities have the potential to cause hearing loss to the public.

(2) Potential for Structural Damage

At this time, blasting is not planned as part of construction for the Facility. If blasting becomes necessary, a detailed discussion of the potential to produce structural damage on any existing proximal building is found in Exhibit 10 Geology, Seismology and Soils.

(n) Noise Abatement Measures for Facility Construction

(1) Noise Abatement Measures

Noise due to construction is an unavoidable outcome of construction. The Applicant will communicate with the public to notify them of the beginning of construction of the Facility. Most of the construction will occur at significant distances to sensitive receptors, and therefore noise from most phases of construction is not expected to result in impacts to sensitive receptors. Nonetheless construction noise will be minimized through the use of BMPs such as those listed below.

- Blasting is not anticipated at this site. However, if necessary, blasting will be limited to daytime hours and conducted in accordance with an approved Blasting Plan.
- Post installation and use of HDD will be limited to daytime hours.
- Pursuant to 16 NYCRR Section 6.2(k)(1), utilizing construction equipment fitted with exhaust systems and mufflers that have the lowest associated noise whenever those features are available and maintaining functioning mufflers on all transportation and construction machinery.
- Maintaining equipment and surface irregularities on construction sites to prevent unnecessary noise.
- Configuring, to the extent feasible, the construction in a manner that keeps loud equipment and activities as far as possible from noise-sensitive locations.
- Using 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 (SAE) J994 and Occupational Safety and Health Administration requirements.

- Developing a staging plan that establishes equipment and material staging areas away from sensitive receptors when feasible.
- Ensuring contractors use approved haul routes to minimize noise at residential and other sensitive noise receptors.

(2) Complaint Management Plan

Complaints due to construction or operation of the Facility have the potential to occur. If complaints do arise, the Complaint Management Plan developed for the Facility will provide information on how and when the public may file a complaint, as well as an identification of any procedures or protocols that may be unique to each phase of the Facility or complaint type. In accordance with 16 NYCRR Section 6.2(a), (c) and (d), the Applicant will provide notice of commencement of construction and completion of construction. The notice will include the procedure and contact information for registering a complaint. To minimize noise impacts during construction, the Applicant will comply with 16 NYCRR Section 6.2(k)(2), which includes responding to noise and vibration complaints according to the complaint resolution protocol approved by the Office.

(3) Compliance with Local Laws

There are no local regulations for solar projects with respect to noise and vibrations.

(o) Noise Abatement Measures for Facility Design and Operation

(1) Wind Facilities

This subsection is not applicable to the Facility.

(2) Solar Facilities

Adverse noise impacts will be avoided or minimized through careful siting of Facility components. The noise emitted by a solar energy facility is limited to daytime periods for the majority of the components. No mitigation is required at any of the central inverters across the Facility Site. One sound barrier wall is proposed at the substation under the current design.

(p) Software Input Parameters

1) GIS files used for the computer noise modeling, including noise source and receptor locations and heights, topography, final grading, boundary lines, and participating status have been submitted to ORES by digital means.

2) The CadnaA computer noise modeling files have been submitted to ORES by digital/electronic means.

3) Site plan and elevation details of the substation, as related to the location of all relevant noise sources are presented in Appendix 7-7.

4) This subsection is not applicable to the Facility.

5) (i) The locations of all noise sources identified with GIS coordinates are presented in Appendix 7-1. The digital GIS files with that information have been submitted to the ORES.

(ii) Sound power level data from the manufacturer for the inverter included in this analysis are presented in Appendix 7-8.

(q) Miscellaneous

(1) A glossary of terminology, definitions, and abbreviations used throughout this Exhibit is included as Appendix 7-9. The references mentioned in the application are presented below.

(2) All information has been reported in tabular, spreadsheet compatible or graphical format as follows:

(i) All data reported in tabular format has been clearly identified to include headers and summary footer rows. Headers include identification of the information contained in each column, such as noise descriptors; weighting; duration of evaluation; time of the day; whether the value is a maximum or average value and the corresponding time frame of evaluation.

(ii) Table titles identify whether the tabular or graphical information corresponds to the "unmitigated" or "mitigated" results, if any mitigation measures are evaluated, and “cumulative” or “non-cumulative” for cumulative noise assessments.

(iii) Columns or rows with results related to a specific design goal, noise limit or local requirement, identify the requirement to which the information relates.

(iv) Tables include rows at the bottom summarizing the results to report maximum and minimum values of the information contained in the columns. Sound receptors are separated in different tables according to their use (e.g., participating residences, non-participating residences, schools, parks, cemeteries, historic places, etc.).

(v) This Exhibit reports estimates of the absolute number of sensitive sound receptors that will be exposed to noise levels that exceed any design goal or noise limit (in total as well as grouped in one (1)-dBA bins)

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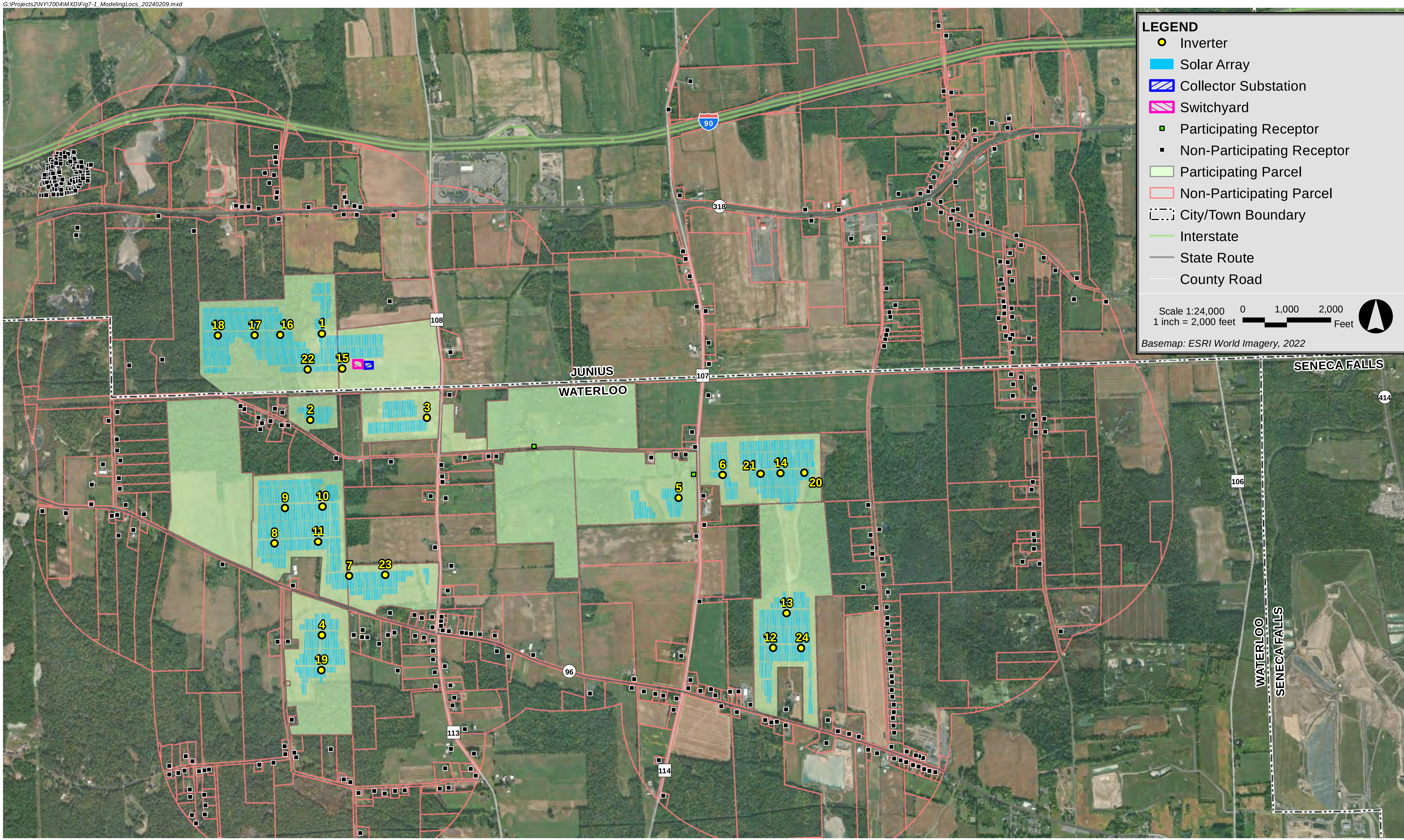


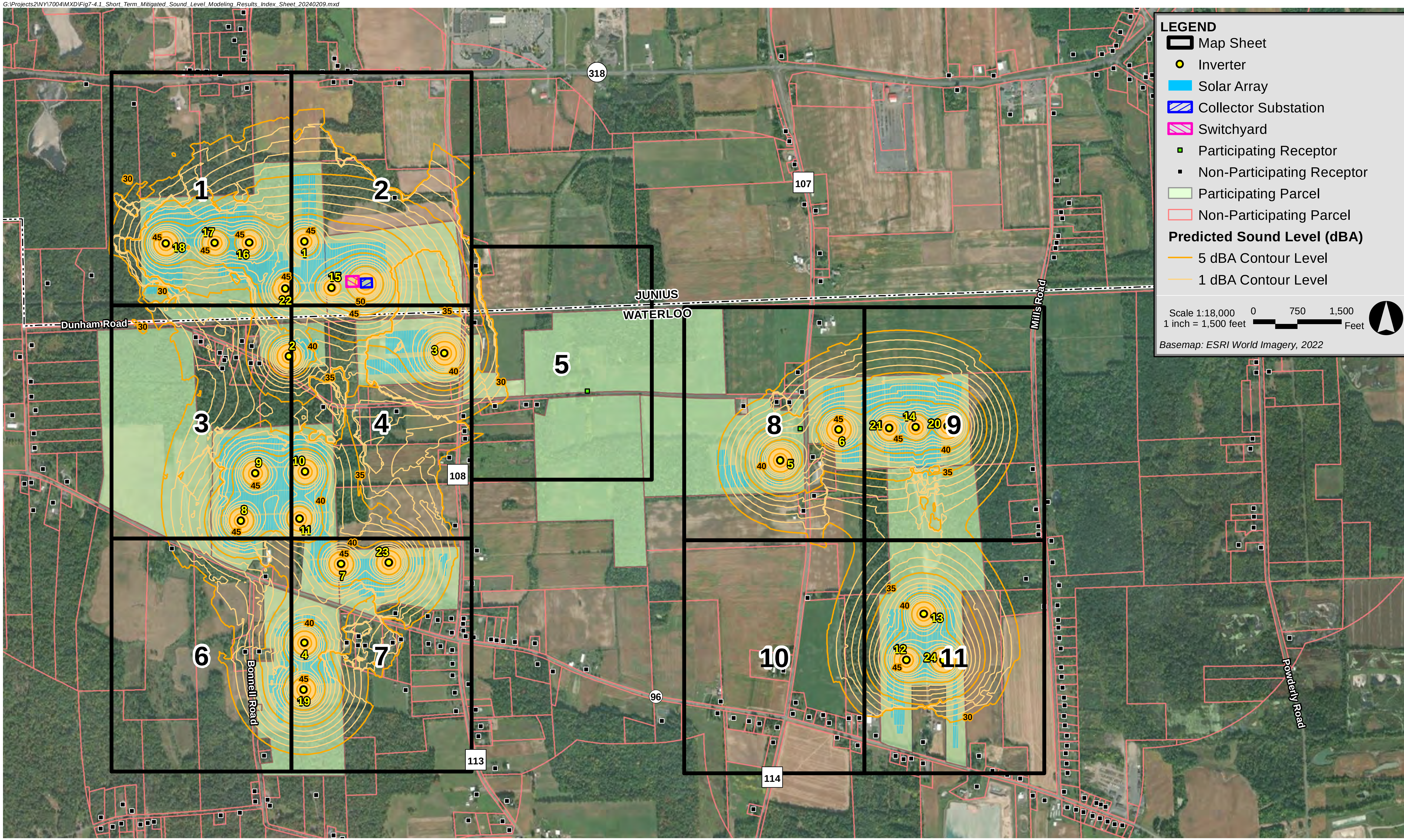
North Seneca Solar Seneca County, New York

Epsilon ASSOCIATES INC.

Figure 7-1 Revised

Sound Modeling Locations

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Index_Sheet_20240209.mxd



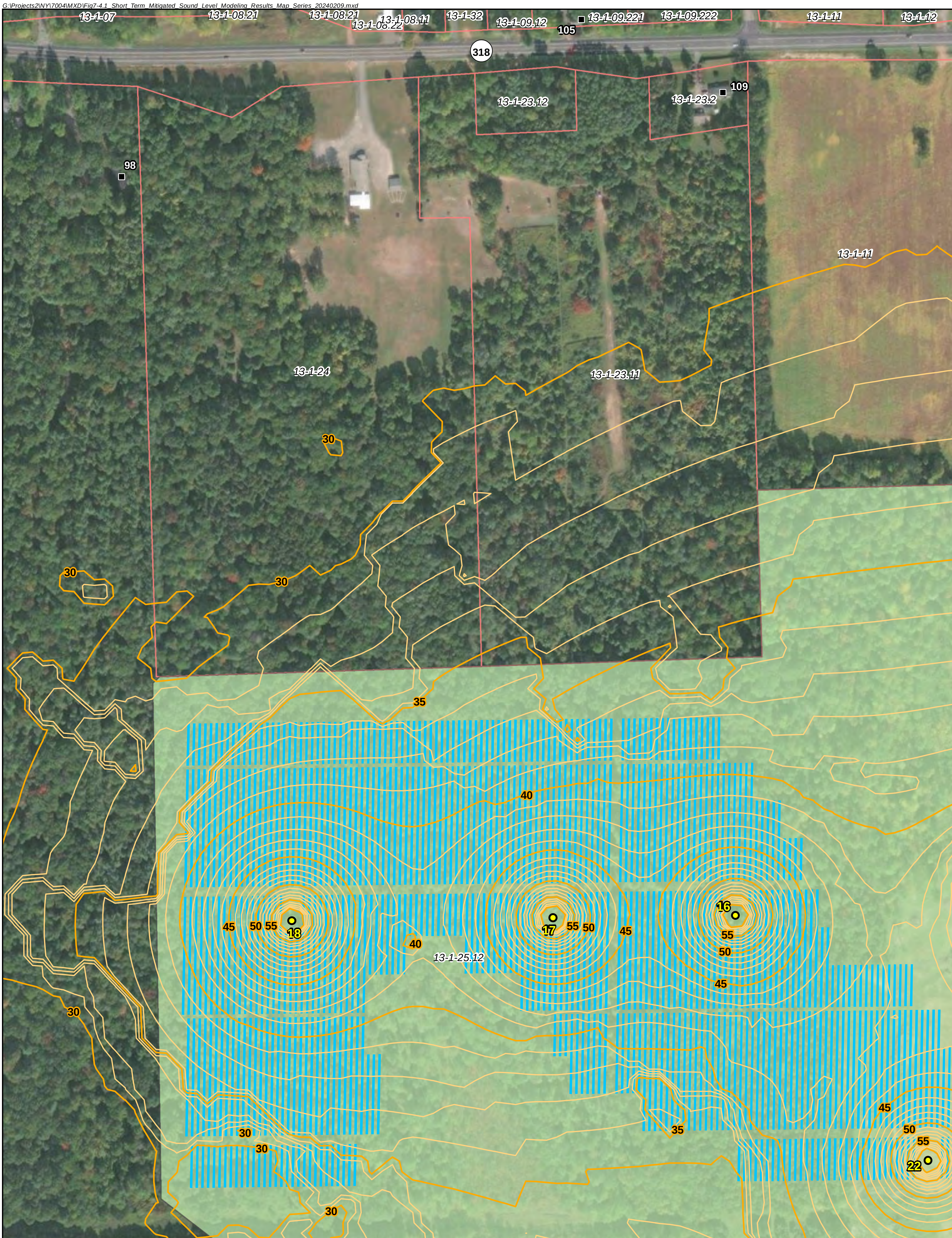
North Seneca Solar Seneca County, New York

Epsilon Associates Inc.

Figure 7-4.1, Index Revised

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd



LEGEND

Inverter	Participating Receptor	**Predicted Sound Level (dBA)**
Solar Array	Non-Participating Receptor	5 dBA Contour Level
Collector Substation	Participating Parcel	1 dBA Contour Level
Switchyard	Non-Participating Parcel	
	City/Town Boundary	

Scale 1:3,600
1 inch = 300 feet
0 150 300
Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 5 3 4 8 9 6 7 10 11

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 1 of 11
Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

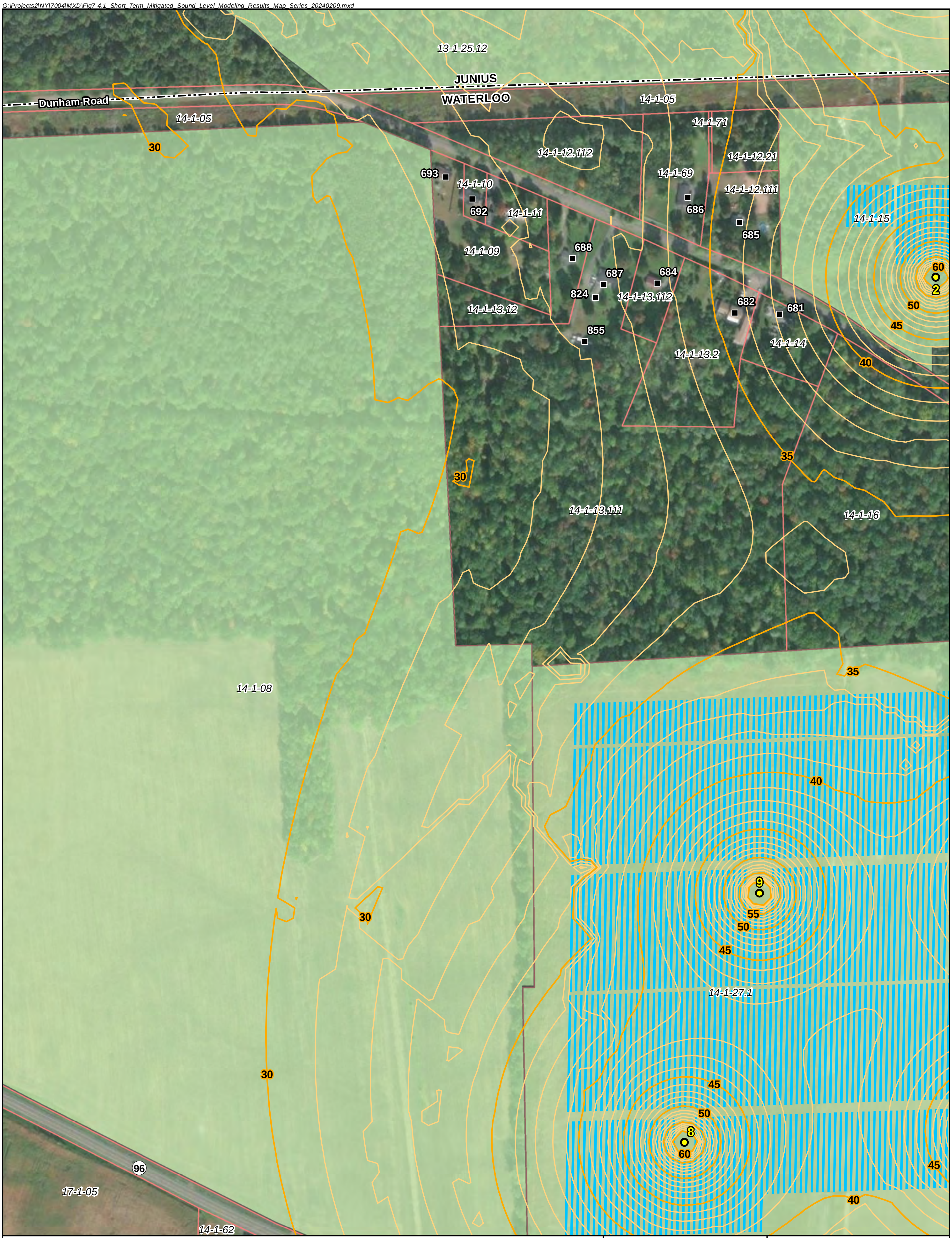
1 2 3 4 5 6 7 8 9 10 11

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 2 of 11
Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd



LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 5 3 4 8 9 6 7 10 11

North Seneca Solar **Seneca, New York**

Epsilon Associates Inc.

Figure 7-4.1 Revised, Map 3 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1	2	5	8	9
3	4		10	11
6	7			

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 4 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

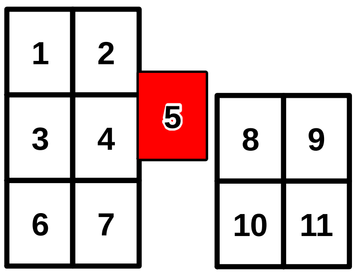
Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet

0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 5 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 3 4 5 6 7 8 9 10 11

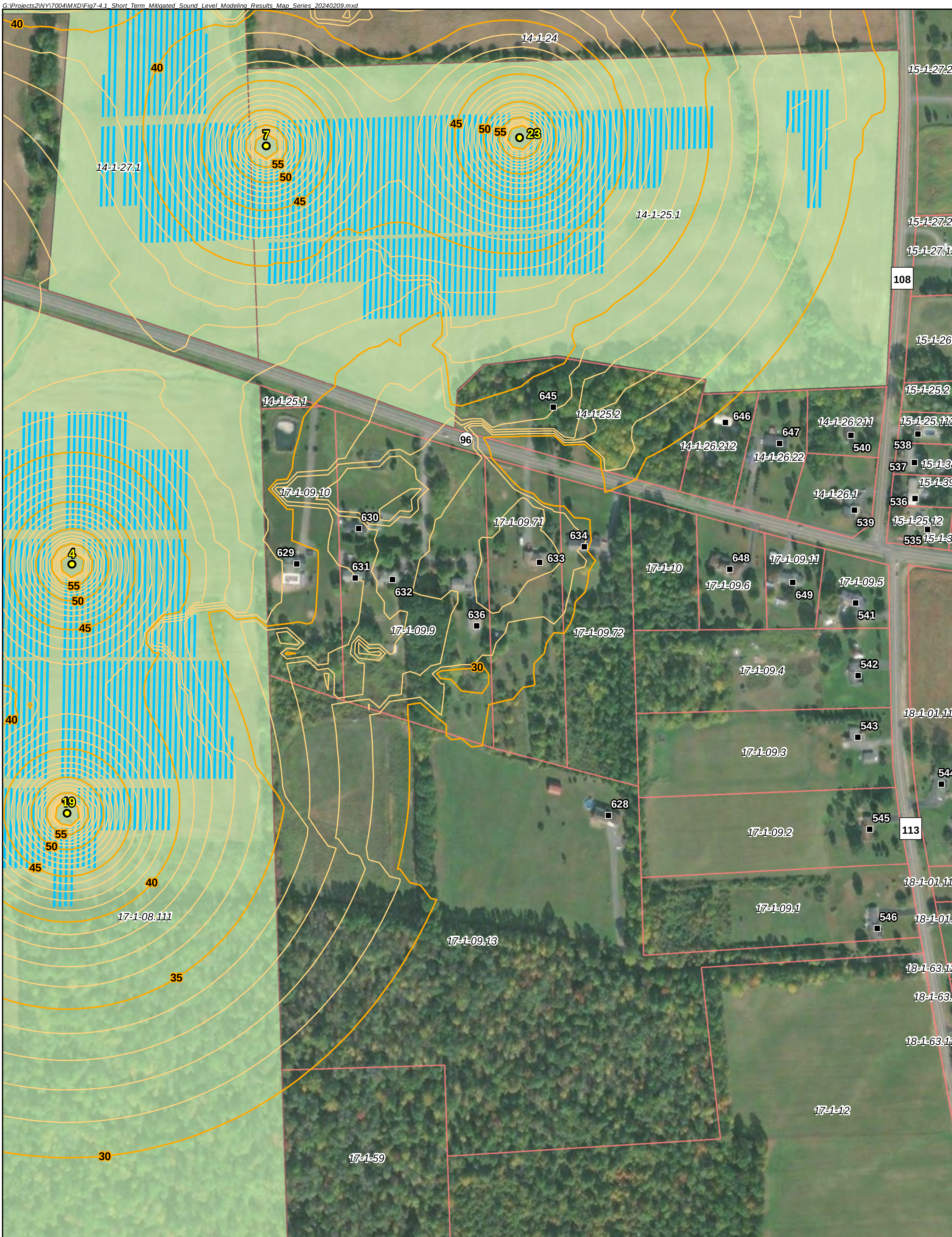
North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 6 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd



LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 5 8 9
3 4
6 7 10 11

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 7 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd

LEGEND

Inverter	Participating Receptor
Solar Array	Non-Participating Receptor
Collector Substation	Participating Parcel
Switchyard	Non-Participating Parcel
	City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet

0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

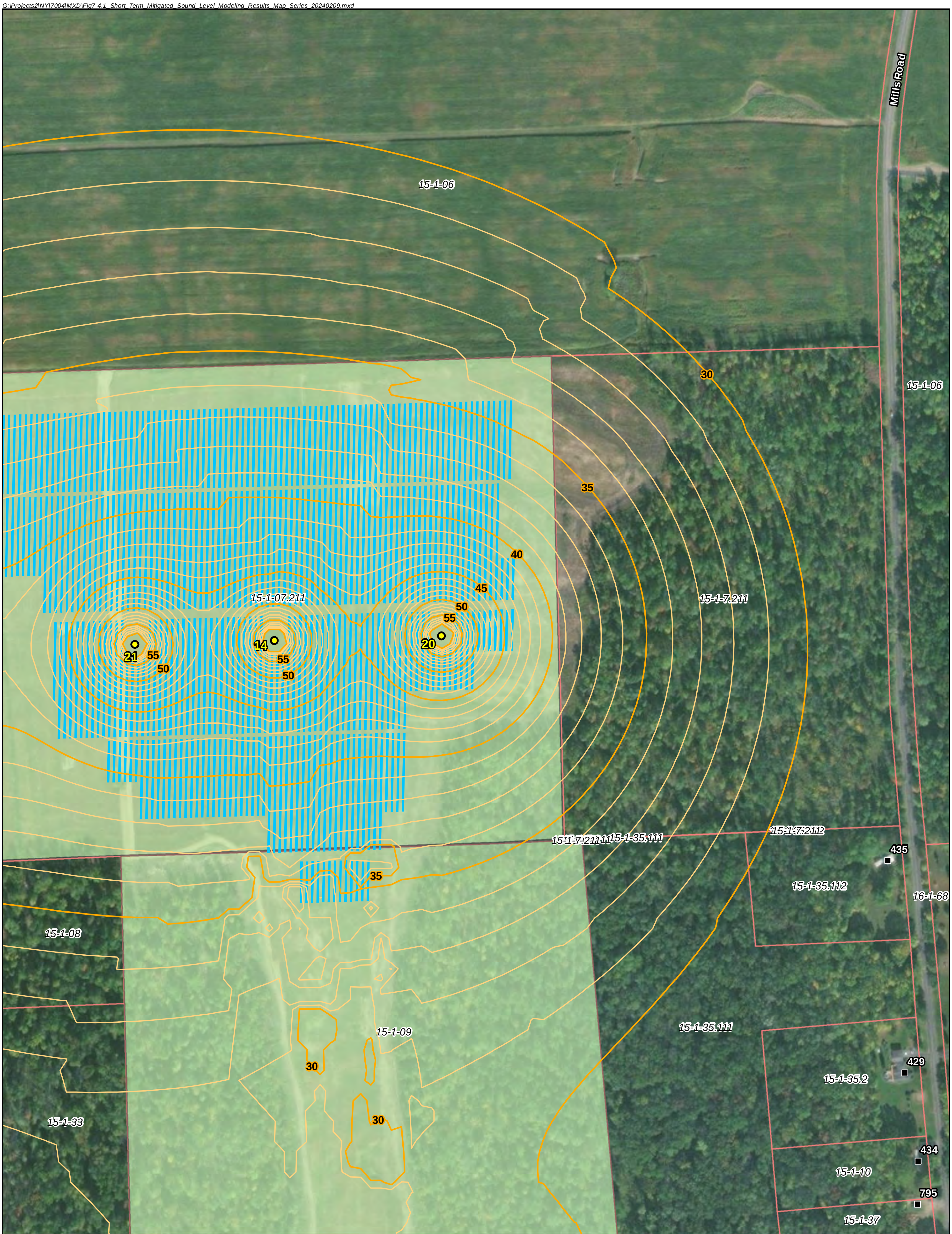
1	2		8	9
3	4	5	10	11
6	7			

North Seneca Solar **Seneca, New York**

Epsilon Associates Inc.

Figure 7-4.1 Revised, Map 8 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results



LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet

0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1	2	5	
3	4	8	9
6	7	10	11

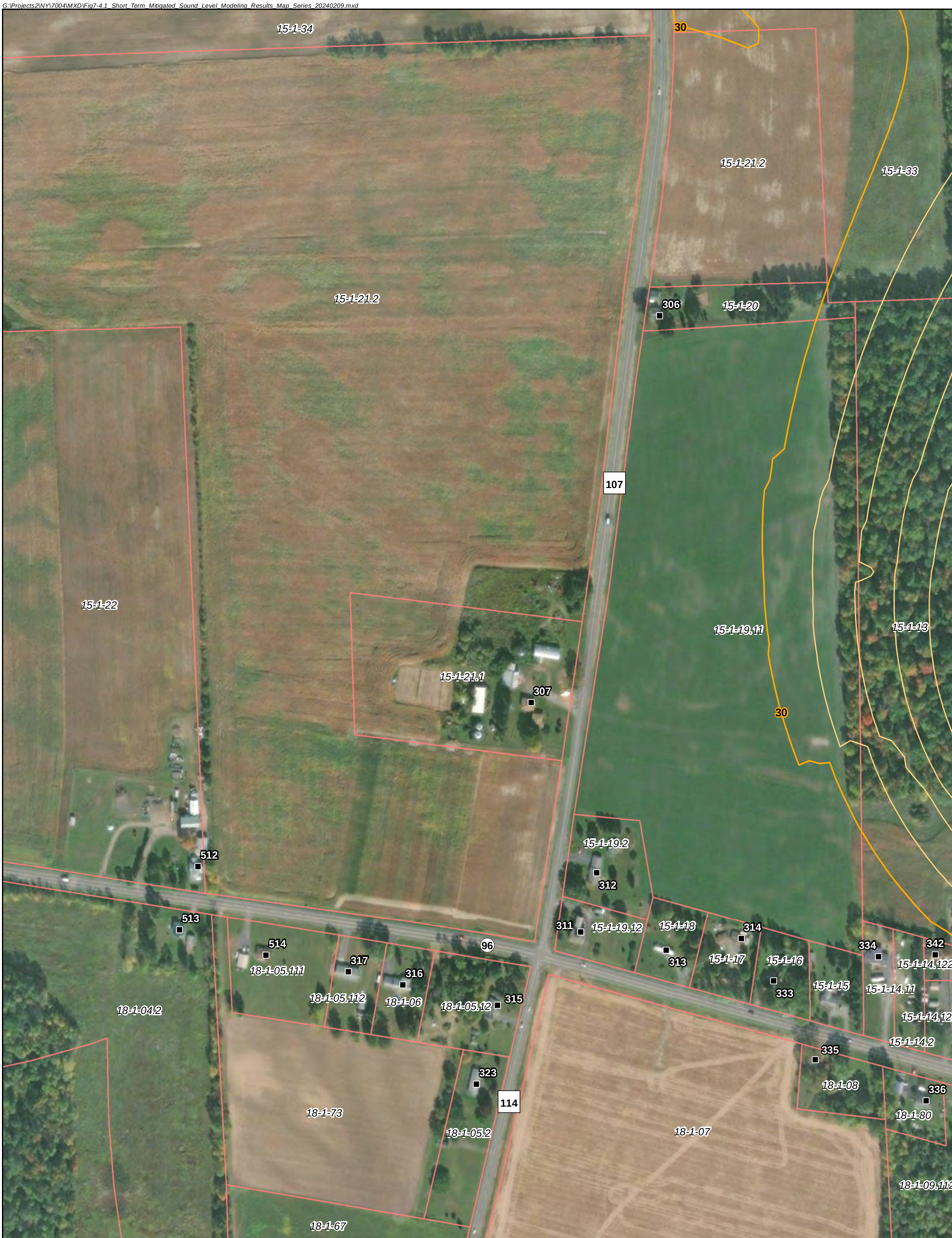
North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 9 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd



LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1	2	5	8	9
3	4		10	11
6	7			

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1 Revised, Map 10 of 11

Short-Term L_{eq} (8-Hr) Sound Level Modeling Results

G:\Projects2\NY\7004\MXD\Fig7-4.1_Short_Term_Mitigated_Sound_Level_Modeling_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary

Predicted Sound Level (dBA)

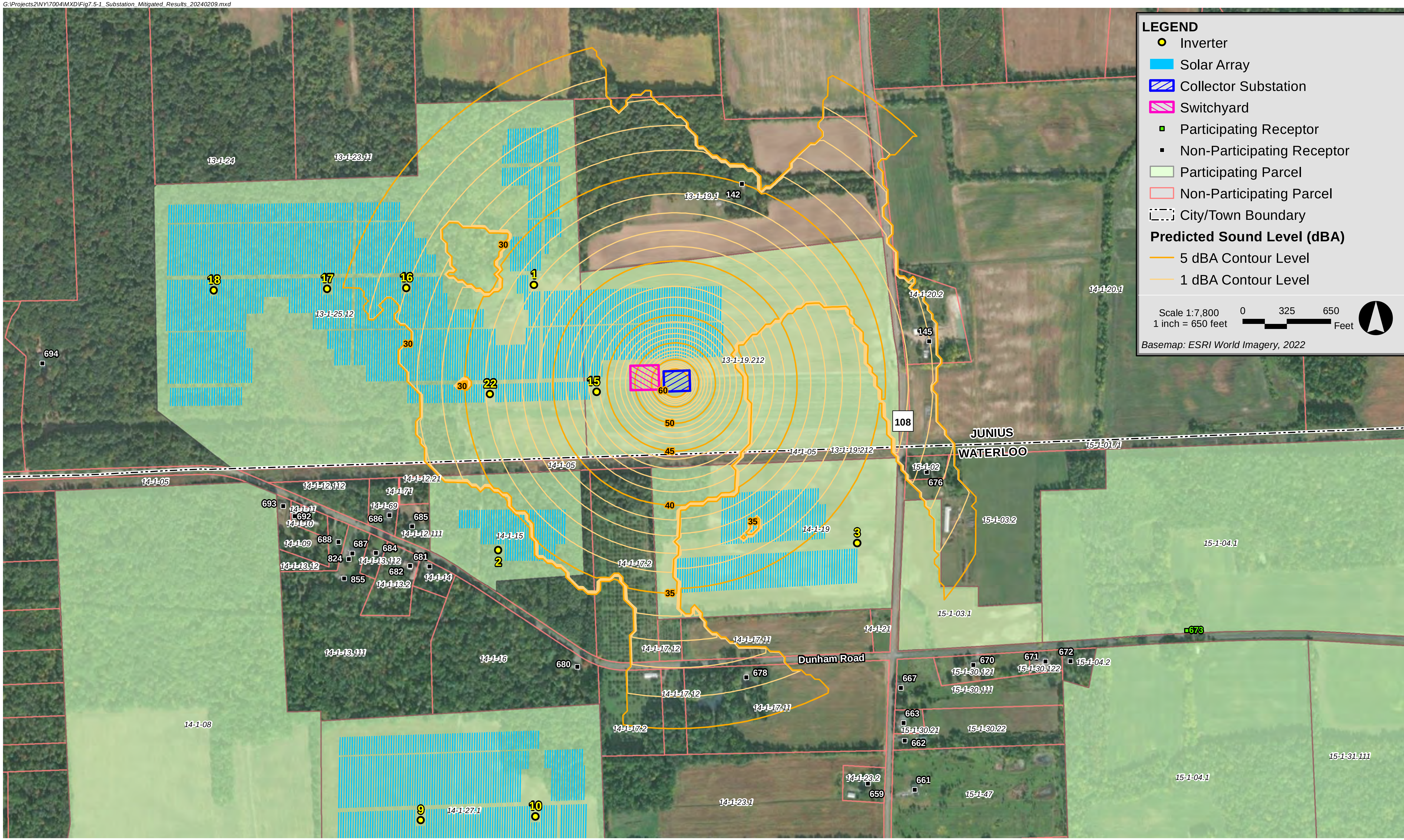
- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,600
1 inch = 300 feet
0 150 300 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1	2			
3	4	5	8	9
6	7		10	11

G:\Projects2\NY\7004\MXD\Fig7.5-1_Substation_Mitigated_Results_20240209.mxd



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Epsilon Associates Inc.

Figure 7.5-1 Revised

Collector Substation Leq (1-Hr) Sound Level Modeling Results

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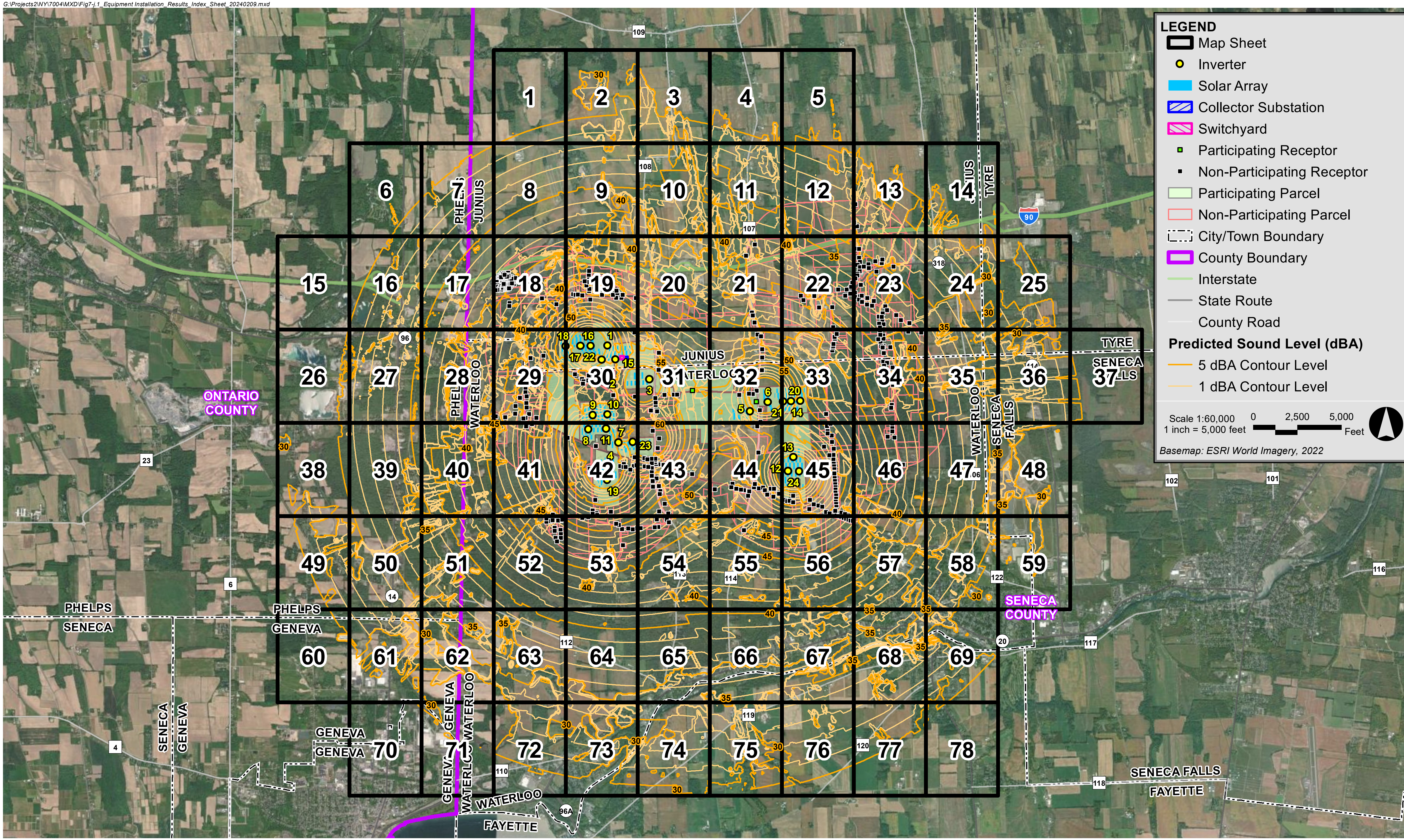

North Seneca Solar Seneca County, New York

Epsilon ASSOCIATES INC.

Figure 7-j.1, Index

Sound Levels During Equipment Installation

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet

0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

North Seneca Solar **Seneca, New York**

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Figure 7-j.1, Map 1 of 78

Sound Levels During Equipment Installation

G:\Projects2\NY\7004\MXD\Fig7-j.1_Equipment Installation_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 3 4 5
6 7 8 9 10 11 12 13 14
15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 2 of 78

Sound Levels During Equipment Installation

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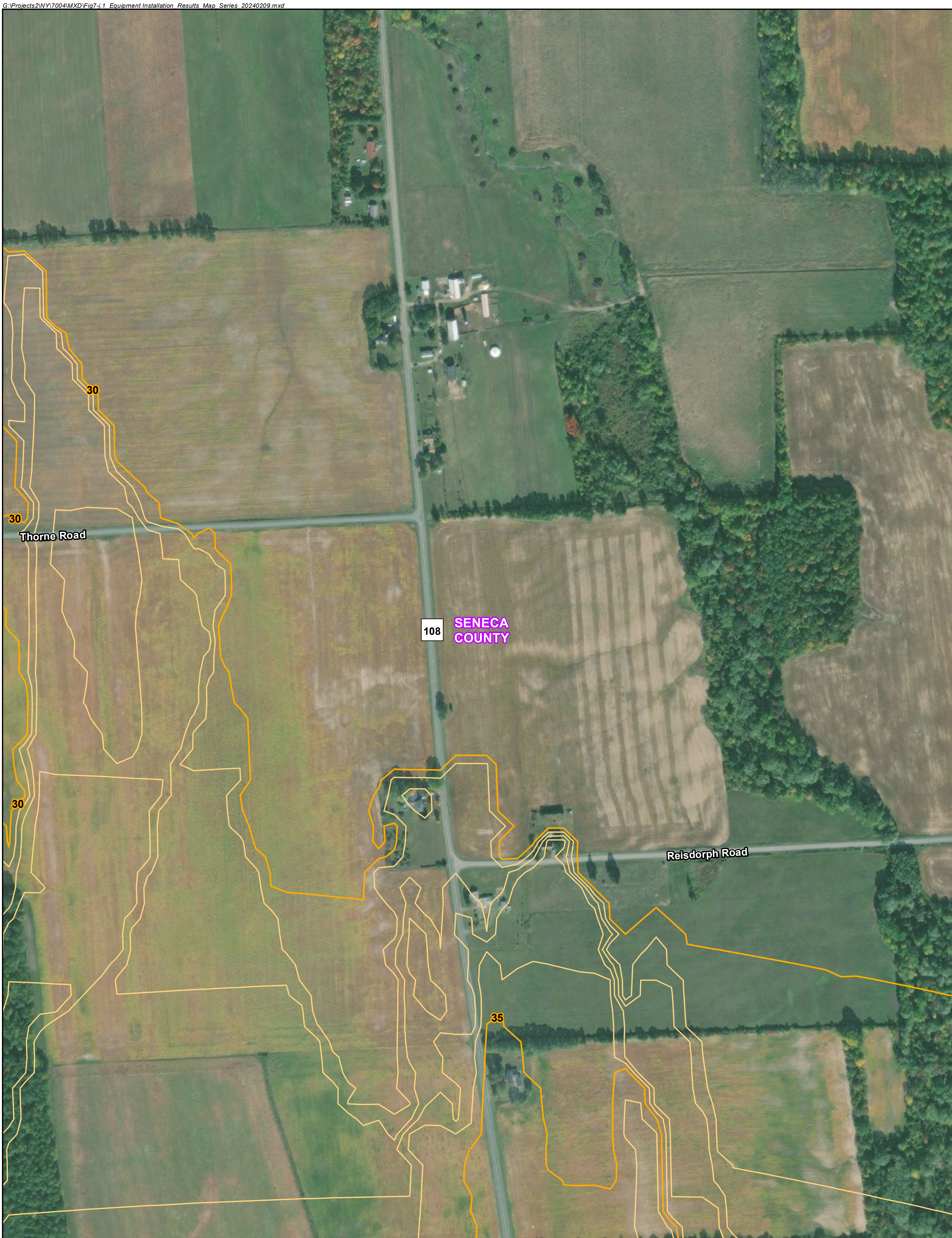


LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 3 of 78
Sound Levels During Equipment Installation

G:\Projects2\NY\7004\MXD\Fig7-j.1_Equipment Installation_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet

0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 3 4 5
6 7 8 9 10 11 12 13 14
15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 4 of 78

Sound Levels During Equipment Installation

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

			1	2	3	4	5				
6	7	8	9	10	11	12	13	14			
15	16	17	18	19	20	21	22	23	24	25	
26	27	28	29	30	31	32	33	34	35	36	37
38	39	40	41	42	43	44	45	46	47	48	
49	50	51	52	53	54	55	56	57	58	59	
60	61	62	63	64	65	66	67	68	69		
	70	71	72	73	74	75	76	77	78		

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 5 of 78
Sound Levels During Equipment Installation

LEGEND

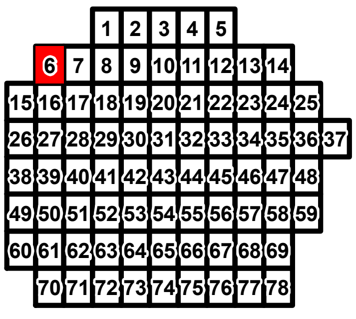
- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community



North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 6 of 78
Sound Levels During Equipment Installation

G:\Projects2\NY\7004\MXD\Fig7-j.1_Equipment_Installation_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet

0 200 400
Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 3 4 5
6 7 8 9 10 11 12 13 14
15 16 17 18 19 20 21 22 23 24 25
26 27 28 29 30 31 32 33 34 35 36 37
38 39 40 41 42 43 44 45 46 47 48
49 50 51 52 53 54 55 56 57 58 59
60 61 62 63 64 65 66 67 68 69
70 71 72 73 74 75 76 77 78

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 7 of 78

Sound Levels During Equipment Installation

G:\Projects2\NY\7004\MXD\Fig7-j.1_Equipment_Installation_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

			1	2	3	4	5					
	6	7	8	9	10	11	12	13	14			
15	16	17	18	19	20	21	22	23	24	25		
26	27	28	29	30	31	32	33	34	35	36	37	
38	39	40	41	42	43	44	45	46	47	48		
49	50	51	52	53	54	55	56	57	58	59		
60	61	62	63	64	65	66	67	68	69			
	70	71	72	73	74	75	76	77	78			

G:\Projects2\NY\7004\MXD\Fig7-j.1_Equipment_Installation_Results_Map_Series_20240209.mxd

LEGEND

- Inverter
- Solar Array
- Collector Substation
- Switchyard
- Participating Receptor
- Non-Participating Receptor
- Participating Parcel
- Non-Participating Parcel
- City/Town Boundary
- County Boundary

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,800
1 inch = 400 feet
0 200 400 Feet

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 9 of 78
Sound Levels During Equipment Installation

North Seneca Solar **Seneca, New York**

Epsilon ASSOCIATES INC.

Figure 7-j.1, Map 10 of 78

Sound Levels During Equipment Installation