Hecate Energy
Cider Solar Farm

Exhibit 7: Noise and Vibration

Cider Solar Farm
Towns of Oakfield and Elba
Genesee County, New York

Matter No. 21-1108

EXHIBIT 7: NOISE AND VIBRATION

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Abbreviations

dBA	A-weighted decibel
Epsilon	Epsilon Associates, Inc.
HDD	horizontal directional drilling
Hz	hertz
ID	identification
ISO	International Organization for Standardization
L_{eq}	equivalent continuous sound level
NYCRR	New York Codes, Rules and Regulations
ORES	Office of Renewable Energy Siting
WHO	World Health Organization

Glossary of Terms

ANS-weighted	A high-frequency natural sound (HFNS) filter applied to the measured one-third octave-band data to remove seasonal noise like insects. This technique removes all sound energy above the 1,250 Hertz frequency band. The methodology for the filtration process is specified in ANSI/ASA S12.100-2014 and the sound pressure levels presented using this methodology are indicated as ANS-weighted levels (presented in dBA).
Applicant	Hecate Energy Cider Solar LLC
G	The portion of ground that is considered porous as defined under ISO 9613-2. This is used as part of the ground attenuation calculation between the source and receiver. For example, a G-factor of 0.5 corresponds to “mixed ground” consisting of half hard and half porous ground cover. A G-factor of zero (0) corresponds to “hard ground” consisting of surfaces with low porosity including water, and a G of 1 represents all porous ground.
Intensity (Loudness)	Sound intensity is a measure of how much energy or power is transmitted. Humans do not perceive increases in sound level (loudness) in a linear manner. For this reason, sound levels are quantified in terms of a logarithmic ratio between the sound pressure of a given noise and the minimum sound pressure discernable by the human ear. This ratio is called the sound pressure level (L_p) and is always reported on a decibel (dB) scale. The logarithmic dB scale accommodates the wide range of sound intensities found in the environment. For example, 0 dB is the minimum discernable sound pressure at 2.9 x 10^{-9} lbs/in^2, while 140 dB is the threshold of pain at 0.029 psi. The ratio of the two sound pressures is 10,000,000, but there is only a 140-dB difference when using the logarithmic scale.
Infrasound	Sound in the frequencies below 20 Hz.
ISO 9613-2	An international standard which specifies an engineering method for calculating the attenuation of sound during outdoor propagation in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound level under meteorological conditions favorable to propagation from sources of known sound emission and is used throughout the United States and the world.
L_{eq}	The equivalent sound level, is the level of a hypothetical steady sound that would have the same energy (*i.e.,* the same time-averaged mean square sound pressure) as the actual fluctuating sound observed. The

	equivalent level is designated L_{eq} and is also A-weighted. The equivalent level represents the time average of the fluctuating sound pressure, but because sound is represented on a logarithmic scale and the averaging is done with linear mean square sound pressure values, the L_{eq} is mostly determined by occasional loud noises.
L_n	Or nth percentile, is the sound level exceeded "n" percent of the time during a measurement period. For example, if 100 sound levels were measured over a 10-minute period, and were sorted from highest to lowest, the L_{90} would be the 90th lowest of the 100 values. The L_{90} is close to the lowest sound level observed. It is essentially the same as the residual sound level, which is the sound level observed when there are no obvious nearby intermittent noise sources. The L_{10} is the sound level exceeded only 10 percent of the time. It is the 10th lowest of the 100 samples described above. It is close to the maximum level observed during the measurement period.
L_{max}	The maximum sound level over a given time period. The L_{max} is typically due to discrete, identifiable events such as an airplane overflight, car or truck pass by, or a dog bark for example.
Low frequency	Sound contained in the frequencies from 20 Hz to 200 Hz.
Octave bands	The International Standards Organization (ISO) has agreed upon "preferred" frequency bands for sound measurement and by agreement the octave band is the widest band for frequency analysis. The upper frequency limit of the octave band is approximately twice the lower frequency limit and each band is identified by its geometric mean called the band center frequency. The octave band center frequencies typically used for sound level analyses are 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 Hz. When more detailed information about a noise is required, standardized one-third octave band analysis may be used.
Project	Refers to the proposed Cider Solar Farm, an up to 500-megawatt utility scale solar project that will be comprised of photovoltaic panels, inverters, access driveways, electrical collection lines, point of interconnection/substation, construction staging areas, fencing and plantings, located on private land in the towns of Elba and Oakfield, Genesee County, New York.
Project Area	Refers to the Project Site and surrounding/adjacent land totaling approximately 7,518 acres.
Project Footprint	Refers to the limit of temporary and permanent disturbance within the Project Site caused by the construction and operation of all components of the Project totaling approximately 2,452 acres.

Project Site	Refers to those privately owned parcels under option to lease, purchase, easement or other real property interests with the Applicant in which all Project components will be sited totaling approximately 4,650 acres.
Study Area	Refers to the area evaluated for specific resource identification and/or resource impact assessment. The size of this area is appropriate for the target resource and takes into account the project setting, the significance of resource or impact being identified or evaluated, and the specific survey distances included in Chapter XVIII, Title 19 of NYCRR Part 900. As appropriate, the Study Area for each type of survey or resource impact assessment is provided in the respective sections within the Application.
Weighting	The sound level meter used to measure noise is a standardized instrument.[1] It contains “weighting networks” to adjust the frequency response of the instrument to approximate that of the human ear under various conditions. One network is the A-weighting network, which most closely approximates how the human ear responds to sound as a function of frequency, and is the accepted scale used for community sound level measurements. Sounds are frequently reported as detected with the A-weighting network of the sound level meter in dBA. A-weighted sound levels emphasize middle frequencies (i.e., middle pitched—around 1000 Hertz sounds), and de-emphasize lower and higher frequencies. The C-weighting network has a nearly flat response for frequencies between 63 Hz and 4000 Hz and is noted as dBC. These are shown graphically below.

[1] *American National Standard Specification for Sound Level Meters*, ANSI S1.4-1983, published by the Standards Secretariat of the Acoustical Society of America, Melville, NY.

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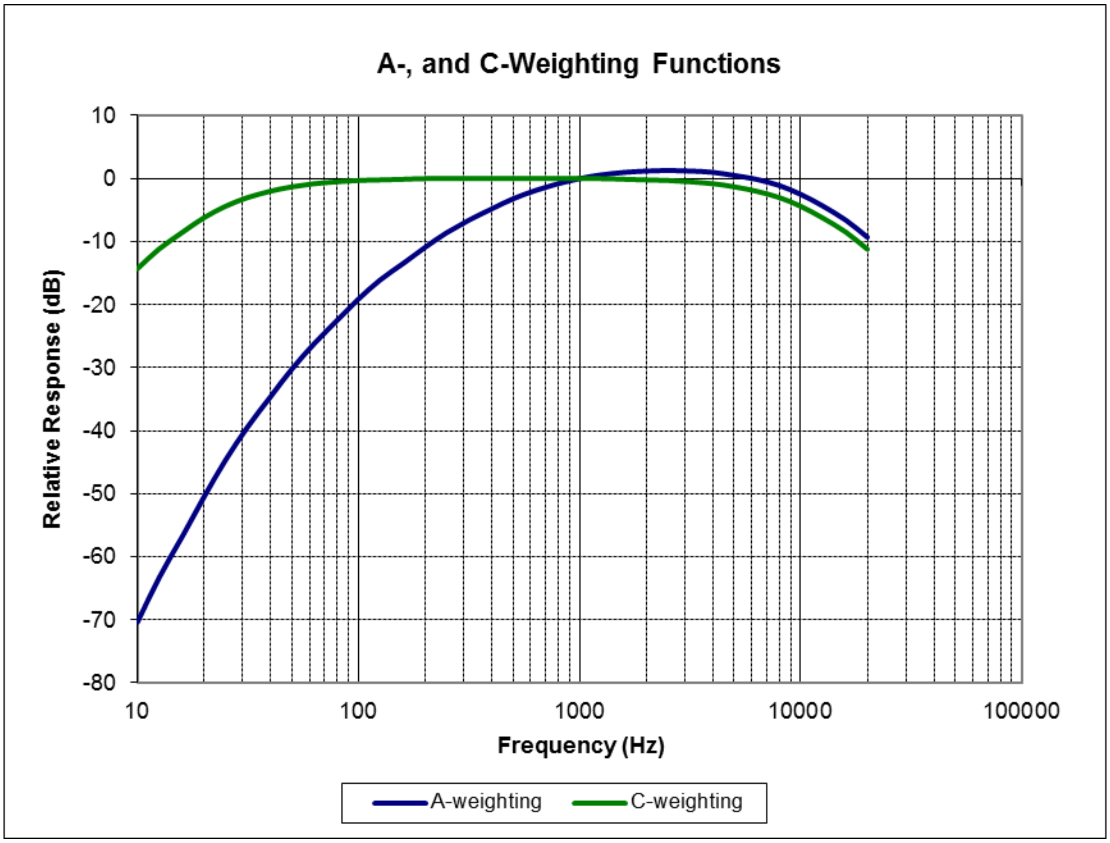

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The content of Exhibit 7 is provided in conformance with Chapter XVIII, Title 19 of the New York Codes, Rules, and Regulations (NYCRR) § 900-2.8, as follows.

a) Name of Preparer

This Exhibit includes a detailed analysis of the potential sound impacts associated with the construction and operation of the Project. Exhibit 7 was prepared by Mr. Robert O'Neal of Epsilon Associates, Inc. (Epsilon). Mr. O'Neal has over 30 years of experience in the areas of community noise impacts, meteorological data collection, and analyses. He is Board Certified by the Institute of Noise Control Engineering in Noise Control Engineering and is a Certified Consulting Meteorologist by the American Meteorological Society. The modeling performed by Epsilon for the Facility is sufficiently conservative in predicting sound impacts, and includes all proposed inverters plus ancillary equipment, and the substation operating at their maximum capacities.

b) Noise Design Goals for the Facility

1) Wind Facilities Design Goals

The requirements of this subpart do not apply to the Project.

2) Solar Facilities Design Goals

The design goals for this solar facility are described below.

i) A maximum noise limit of 45 A-weighted decibels (dBA) equivalent continuous sound level (L_{eq}) (8-hour), at the outside of any existing non-participating residence, and 55 dBA L_{eq} (8-hour) at the outside of any existing participating residence. The Project meets these limits as discussed in Section (l) of this Exhibit.

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

iii) A prohibition on producing any audible prominent tones, as defined by using the constant level differences listed under 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 broadband overall (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 project has a tone at 5000 hertz (Hz). Therefore, the effective limit for non-participating residents is 40 dBA L_{eq} (8-hour) for evaluation of compliance with subparagraph (i) of this paragraph. The Project meets these limits as discussed in Section (e) of this Exhibit.

iv) A maximum noise limit of 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 19 NYCRR § 900-1.3(e) and utility right-of-way 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 Project meets these limits as discussed in Sections (k) and (l) of this Exhibit.

There are no applicable sound level requirements in the Town of Oakfield or the Town of Elba.

c) Radius of Evaluation

1) Wind Facilities Radius of Evaluation

The requirements of this subpart do not apply to the Project.

2) Solar Facilities Radius of Evaluation

All sensitive receptors within at least a 1,500-foot radius from any noise source (e.g., substation transformer[s], medium to low voltage transformers, inverters) proposed for the facility or within the 30 dBA noise contour, whichever is greater, were included in the analysis. Each of these sensitive receptors are visible in Figure 7-1: *Sound Level Modeling Locations*.

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 a Cider Solar noise source or within the 30 dBA noise contour, so a cumulative analysis is not required. Details supporting this conclusion are found in Appendix 7-A.8: *Cumulative Analysis*.

d) Modeling Standards, Input Parameters, and Assumptions

1) Modeling Software Description

An estimate of the noise level to be produced by the Project made using the following assumptions.

i) Future sound levels associated with the Project were predicted using the Cadna/A noise calculation software developed by DataKustik GmbH. This software implements International Organization for Standardization (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 Hz to 8000 Hz. As per 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 was added to the results, pursuant to 19 NYCRR § 900-2.8(d).

   Elevation contours for the modeling domain were directly imported into Cadna/A, 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 developed by the United States Geological Survey.

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.

a. 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 147 inverters as provided to Epsilon by the Applicant. The source location coordinates, ground elevations, and heights above ground are summarized in Appendix 7-A.1: *List of Modeled Sound Sources*. There is one inverter manufacturer (Sungrow) evaluated for this analysis. All 147 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: *Power Inverter Analyzed for Sound Level Assessment*. The low-voltage transformer associated with each inverter has a sound power level 26 dBA quieter than each inverter (92 dBA versus 66 dBA), so its contribution is negligible, and it was not included in the site-wide sound model.

Table 7-1: Power Inverter Analyzed for Sound Level Assessment

Manufacturer	Inverter Model	Maximum Electrical Output (kVA)	Dimensions (WxHxD) (meter)
Sungrow	SG3600UD-MV	3,600	6.1 x 2.9 x 2.4

Key: kVA = kilovolt-amp; WxHxD = (width) x (height) x (depth)

Broadband and one-third octave band sound power levels for the Sungrow inverter operating under typical (daylight) conditions were provided by the Applicant[2]. The octave band sound power levels are presented in Table 7-2: *Inverter Octave Band Sound Power Levels*.

Table 7-2: Inverter Octave Band Sound Power Levels

Inverter Type	Broadband Sound Power Level	Sound Power Levels per Octave-Band Center Frequency (Hz)								
		31.5	63	125	250	500	1000	2000	4000	8000
	(dBA)	dB	dB	dB	dB	dB	dB	dB	dB	dB
SG3600 UD-MV	92	86	85	87	86	90	81	80	88	81

Key: dB = unweighted decibel; dBA = A-weighted decibel; Hz = Hertz

[2] ATC210014 Test report for SG3600UD-MV, provided April 12, 2021.

Collector Substation

In addition to the inverters, there will be a collector substation located within the Project Site. The modeling inputs of the transformers -- coordinates, ground elevation, and height above ground -- are summarized in Appendix 7-A.1. Two step-up transformers rated at up to 281 megavolt-amps each are proposed for the collector substation. Broadband sound power levels were provided by the Applicant[3] and 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. The sound power level data used in the modeling is summarized in Table 7-3: *Collector Substation Transformer Sound Power Level (Per Unit)*.

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 dB	63 dB	125 dB	250 dB	500 dB	1000 dB	2000 dB	4000 dB	8000 dB
281	98	95	101	103	98	98	92	87	82	75

Key: dB = unweighted decibel; dBA = A-weighted decibel; Hz = Hertz; MVA = Mega Volt-Amp;

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

iii) 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.

iv) 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 31.5 Hz up to the 8000 Hz full-octave band, at all sensitive sound receptors within the radius of evaluation are discussed and presented in Section (l) of this Exhibit.

v) The maximum A-weighted dBA L_{eq} sound pressure levels (L_{eq} [8-hour]) at the most critically impacted external property boundary lines of the Protect Site (e.g., non-participating parcel boundary lines outside of the Project Site) are shown in Figure 7-4.1: *Short-term Sound Level Modeling Results*.

vi) A summary of the number of receptors exposed to sound levels greater than 35 dBA are shown grouped in 1-dBA bins in Table 7-4: *Receptors Modeled at 35 dBA or Greater – L_{eq} (8-hour)*. An “Accessory” structure is a building on a residential parcel, which may include a detached garage or some type of similar non-principal structure (boat house, pool house, storage shed, etc.). There are no sound level limits applicable to these structures, but they are provided for informational purposes.

[3] Test report TR 20.0347 pg. 125 of 204, provided April 12, 2021.

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

Modeled L_{eq} Sound Level (dBA)	# of Receptors					
	Residential		Non-Residential		Accessory[1]	
	Participating	Non-Participating	Participating	Non-Participating	Participating	Non-Participating
45	0	0	0	0	0	0
44	0	0	0	0	0	0
43	0	0	0	0	0	0
42	0	0	0	0	0	0
41	0	0	0	0	1	1
40	0	1	0	0	0	1
39	0	4	0	0	2	7
38	2	11	0	1	3	8
37	2	11	3	0	1	10
36	1	28	3	1	1	12
35	1	31	3	1	3	24

Key: dBA = A-weighted decibel

[1] An accessory building includes structures such as detached garage or non-principal structure (boat house, pool house, storage shed, etc.) on a residential parcel.

vii) Sound level contours as specified in 19 NYCRR § 900-2.8(k) are shown in Figure 7-4.1.

2) Wind Facilities Modeling

The requirements of this subpart do not apply to the Project.

3) Solar Facilities Modeling

The Cadna/A model used a 1.5-meter assessment point above the ground. No uncertainty factor was added to the modeled results.

e) Prominent Tones

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)
- 5 dB in high-frequency one-third-octave bands (from 500 up to 10000 Hz)

1) Noise Source Evaluation

Sound pressure level calculations using the Cadna/A modeling software that 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. Instead, one-third octave band sound pressure levels due to the closest inverters were calculated at the nearest five potentially impacted and representative receptor locations (both non-participants and participants) using equations accounting for hemispherical radiation and atmospheric absorption. Received sound pressure levels due to the closest inverters at each of these locations are predicted to result in a prominent discrete tone at the 5000 Hz one-third octave band as shown in Table 7-5: *Tonal Analysis & Compliance Evaluation: Modeled Sound Pressure Levels from Inverters*. Due to this prominent tone, a 5 dBA penalty is being applied on a short-term broadband basis to non-participating residential receptors (40 dBA). Despite the observed prominent tone and subsequent broadband penalty, short term broadband sound pressure levels do not exceed 40 dBA at any non-participating residences without any mitigation measures.

2) Substation Transformers and Other Solar Facility Evaluation

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 the spreadsheet modeling approach was not possible. For this reason, the substation transformer was assumed to be tonal and prominent by default.

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Table 7-5: Tonal Analysis & Compliance Evaluation: Modeled Sound Pressure Levels from Inverters

Receptor ID	**One-Third Octave Band Center Frequency (Hz)**	25	**31.5**	40	50	**63**	80	100	**125**	160	200	**250**	315	400	**500**	630	800	**1000**	1250	1600	**2000**	2500	3150	**4000**	5000	6300	**8000**	10000
	Tonal Limit	-	15	15	15	15	15	15	15	8	8	8	8	8	5	5	5	5	5	5	5	5	5	5	5	5	5	-
519	Received Sound Pressure Level (dB)	29	34	35	34	33	32	33	37	32	30	33	36	40	38	33	31	28	26	26	27	27	25	20	35	25	15	9
	Average Sound Pressure Level of Contiguous Bands	-	32	34	34	33	33	34	33	33	33	33	36	37	36	34	31	28	27	26	27	26	24	30	22	25	17	-
	Difference between Sound Pressure Level and Contiguous Average	-	2	1	0	0	-1	-1	4	-1	-3	0	0	3	2	-1	0	0	-1	0	0	2	2	-10	13	0	-2	-
	Below Tonal Limit?	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	-
581	Received Sound Pressure Level (dB)	30	35	36	35	34	33	34	37	33	31	34	37	40	39	34	31	29	27	27	27	28	25	20	34	24	13	5
	Average Sound Pressure Level of Contiguous Bands	-	33	35	35	34	34	35	33	34	34	34	37	38	37	35	31	29	28	27	27	26	24	30	22	23	14	-
	Difference between Sound Pressure Level and Contiguous Average	-	2	1	0	0	-1	-1	4	-1	-3	0	0	3	2	-1	0	0	-1	0	0	2	2	-10	13	0	-2	-
	Below Tonal Limit?	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	-
520	Received Sound Pressure Level (dB)	28	33	34	33	32	31	32	35	31	29	32	35	38	37	32	30	27	26	26	26	28	26	22	39	32	25	25
	Average Sound Pressure Level of Contiguous Bands	-	31	33	33	32	32	33	31	32	32	32	35	36	35	33	30	28	27	26	27	26	25	33	27	32	28	-
	Difference between Sound Pressure Level and Contiguous Average	-	2	1	0	0	-1	-1	4	-1	-3	0	0	3	2	-1	0	0	-1	0	0	1	1	-11	12	-1	-3	-
	Below Tonal Limit?	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	-
521	Received Sound Pressure Level (dB)	27	32	33	32	31	30	31	34	30	28	31	34	37	36	31	29	26	25	25	25	27	25	21	38	31	24	23
	Average Sound Pressure Level of Contiguous Bands	-	30	32	32	31	31	32	30	31	31	31	34	35	34	32	29	27	26	25	26	25	24	32	26	31	27	-
	Difference between Sound Pressure Level and Contiguous Average	-	2	1	0	0	-1	-1	4	-1	-3	0	0	3	2	-1	0	0	-1	0	0	1	1	-11	12	-1	-3	-
	Below Tonal Limit?	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	-
1163	Received Sound Pressure Level (dB)	28	33	34	33	32	31	32	36	31	29	32	35	38	37	32	29	27	25	25	25	25	23	17	31	20	8	0
	Average Sound Pressure Level of Contiguous Bands	-	31	33	33	32	32	33	32	32	32	32	35	36	35	33	29	27	26	25	25	24	21	27	18	20	10	-
	Difference between Sound Pressure Level and Contiguous Average	-	2	1	0	0	-1	-1	4	-1	-3	0	0	3	2	-1	0	0	-1	0	0	2	2	-10	13	0	-2	-
	Below Tonal Limit?	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	-

Key: dB = unweighted decibel; Hz = Hertz; ID = identification

f) Low Frequency Noise for Wind Facilities

The requirements of this subpart do not apply to the Project.

g) Infrasound for Wind Facilities

The requirements of this subpart do not apply to the Project.

h) Sound Study Area

Figure 7-1 shows the location of sensitive sound receptors in the Study Area in relation to the Project (including the substation and the point of interconnect).

1) Sensitive Sound Receptors

In total, 1,185 discrete receptors were analyzed for the Project. These include 634 residential receptors, 403 accessory receptors, and 148 non-residential receptors. Of the 1,185 receptors, 29 were participating, and 1,156 were non-participating, as defined in Section (h)(3) below. Of the 403 accessory[4] receptors, 12 were participating and 391 were non-participating. Of the 148 non-residential receptors, 10 were participating and 138 were non-participating. A detailed listing of all receptors including receptor identification (ID), latitude/longitude, elevation, participation status, and receptor category is included as Appendix 7-A.2: *List of Sound Receptors*.

2) Residences

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

3) Participating Parcels

Only parcels that are under a signed contract with the Applicant prior to the date of filing the Application were identified as “participating.” Other properties were designated as “non-participating.”

i) Evaluation of Ambient Pre-Construction Baseline Noise Conditions

An evaluation of ambient pre-construction baseline noise conditions was conducted for 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-A.3: *Ambient Pre-Construction Sound Level Measurement Program*.

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[4] An accessory building includes structures such as detached garage or non-principal structure (boat house, pool house, storage shed, etc.) on a residential parcel.

j) Evaluation of Future Noise Levels during Construction

1) Modeling Standards

Future construction noise modeling was performed for the main phases of construction and from activities at the proposed batch plant/laydown area using the ISO 9613-2:1996 sound propagation standard as implemented in the Cadna/A software package. Reference sound source information was obtained from either Epsilon's consulting files or the Federal Highway Administration's Roadway Construction Noise Model.

2) Construction Noise Modeling

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. By its very nature, construction activity moves around the Project 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. The equipment sound levels for the louder pieces of construction equipment expected to be used at this site along with their phase of construction are presented in Table 7-6: *Sound Levels for Noise Sources Included in Construction Modeling*.

Table 7-6: 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 PD 10 Pile Driver	84
Equipment Installation	(6) Pickup Truck/ATV	55

Phase	Equipment	Sound Level at 50 feet (dBA)
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

Key: dBA = A-weighted decibel; hp – horsepower; ATV = all-terrain vehicle

3) Operational Noise Modeling

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

4) Sound Impacts

Worst-case sound levels from construction activity are shown using sound level contours in Figure 7-j.1: *Construction Sound Level Modeling Results; Area 1; Area 2* and sound levels at the most critically impacted receptors are shown in Table 7-7: *Construction Noise Modeling Results – Area 1 Construction (dBA)* and 7-8: *Construction Noise Modeling Results – Area 2 Construction (dBA)*.

Two areas within the Project Area were chosen to calculate worst case construction sound levels. The areas and assumed locations of simultaneous construction are:

- Area 1 – This area includes the closest receptors to a solar array panel. Modeling assumed simultaneous construction activity at this solar array panel. Site preparation and grading work, trenching and road construction work, equipment installation work, and commissioning work was modeled at this location.
- Area 2 – This area includes all receptors 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.

For each of the areas, construction sound levels at the 10 closest receptors have been calculated. These receptors included both non-participants and participants. 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. At other areas of construction (i.e., substation, laydown yards, inverter pads), sound levels due to construction would be lower, as those locations are further from receptors than the two areas that were analyzed.

Area 1 Modeling Results

The cumulative impacts from site preparation and grading work, trenching and road construction work, equipment installation work, and commissioning work was calculated with the Cadna/A model for the 10 closest receptors to construction activity within Area 1. The loudest phase of construction within this area will be trenching and road construction work. A sound contour figure of trenching and road construction work occurring at the solar array is presented in Figure 7-j.1.

The highest sound level at a non-participating receptor within this area is 68 dBA during site preparation and grading (Receptor #468), 70 dBA during trenching and road construction (Receptor #468), 70 dBA during equipment installation (Receptor #468), and 34 dBA during commissioning (Receptor #468). Modeling results of construction sound levels within this area are summarized in Table 7-7.

Table 7-7: Construction Noise Modeling Results – Area 1 Construction (dBA)

Receptor ID	Distance (meters)	Participation Status	Site Preparation and Grading	Trenching and Road Construction	Equipment Installation	Commissioning
481	18	Participating	85	87	86	51
477	49	Participating	76	78	78	41
468	111	Non-Participating	68	70	70	34
476	112	Non-Participating	68	70	69	34
478	113	Non-Participating	68	69	69	33
475	135	Non-Participating	66	68	68	32
474	164	Non-Participating	64	66	66	30
422	213	Non-Participating	62	64	64	28
479	240	Non-Participating	61	63	63	27
472	266	Non-Participating	60	62	62	26

Area 2 Modeling Results

The cumulative impacts from HDD work and commissioning work were calculated with the Cadna model for the 10 closest receptors to construction activity within Area 2. 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.1.

The highest sound level at a non-participating receptor within this area is 76 dBA during HDD (Receptor #600) and 48 dBA during commissioning (Receptor #600). Modeling results of construction sound levels within this area are summarized in Table 7-8, and a sound contour figure of results is shown in Figure 7-j.1.

Table 7-8: Construction Noise Modeling Results – Area 2 Construction (dBA)

Receptor ID	Distance (meters)	Participation Status	HDD	Commissioning
600	29	Non-Participating	76	48
601	85	Non-Participating	66	37
599	114	Non-Participating	63	34
598	141	Non-Participating	61	32
597	219	Non-Participating	58	28
580	232	Participating	57	27
582	236	Participating	57	27
596	253	Non-Participating	56	27
594	284	Non-Participating	55	26
581	287	Participating	56	25

Construction Noise Conclusions

Noise due to construction is an unavoidable outcome of construction. The five major construction phases are: site preparation and grading, trenching and road construction, HDD, equipment installation, and commissioning. Most of the construction will occur at significant distances to sensitive receptors; therefore, noise from most phases of construction is not expected to result in impacts to sensitive receptors. There are a few instances where construction will be fairly close to residences (#477, #481, #599, #600 & #601) and coordination with these neighbors may be warranted. Construction noise will be minimized through the use of best management practices.

k) Sound Levels in Graphical Format

1) Sound Contour Lines

Figure 7-4.1 presents future L_{eq} (8-hour) sound contour lines showing expected sound levels during worst-case operation of the Project's inverters plus the collector substation using the methodology described above. Future L_{eq} (1-hour) sound contour drawings showing expected, mitigated sound levels during worst-case operation of the Project's collector substation-only using the methodology described above are presented in Figure 7-5.1: *Substation Sound Level Modeling Results—Mitigated*.

2) Sensitive Sound Receptors

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

3) Sound Contour Standards

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

4) Full-size Hard Copy Maps

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).

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

All sources running--inverters plus the collector substation

Future L_{eq} (8-hour) sound levels during worst-case operation of the Project's inverters plus the collector substation have been calculated using the methodology described above. The predicted A-weighted (dBA) and full octave band frequency (31.5 Hz to 8000 Hz) sound pressure levels at all sensitive receptors are provided in Appendix 7-A.4: *Project Modeled Sound Levels – L_{eq} (8-hour)*. The results, which are sorted by receptor ID and sorted by A-weighted sound level high to low, and then are broken down by receptor type (Residential, Non-Residential, and Accessory) and participation (Non-Participating and Participating), are presented in Tables 7-4.1a through Table 7-4.1l (Appendix 7-A.4). Tables 7-4.1a and 7-4.1b include the effect of substation mitigation.

The highest sound levels at residential receptors, under this scenario are:

- Non-participating receptor = 40 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 observed prominent tone and subsequent 5 dBA penalty. Thus, the project 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. The highest sound level due to the project at a non-participating property line occurs at two locations. The first is 50 dBA on Parcel ID: 16.-1-16, near Inverter 42. The second is near the collector substation with a sound level of 50 dBA on Parcel ID: 16-1-7.22.

Collector substation only

Future L_{eq} (1-hour) sound levels during worst-case operation of the Project's collector substation only have been calculated using the methodology described above. The predicted dBA and full octave band frequency (31.5 Hz to 8000 Hz) sound pressure levels at all residences are provided in Appendix 7-A.5: *Collector Substation Modeled Sound Levels – L_{eq} (1-hour)*. The results are sorted by receptor ID and sorted by A-weighted sound level from high to low for all Non-Participating residences. In addition, there are unmitigated and mitigated tables, as mitigation is expected to occur at the collector substation. In total, there are four tables from Table 7-5.1a to 7-5.1.b (unmitigated) and Table 7-5.2a to 7-5.2b (mitigated) found in Appendix 7-A.5.

Mitigation in the form of either a quieter transformer or a sound barrier wall is expected to be used at the collector substation in order to achieve the design goal of 35 dBA. The quieter transformer option would require each transformer to have a sound power level of 94 dBA or less (4 dBA quieter than the one assumed in this modeling; 98 dBA-4 dBA = 94 dBA) or a sound barrier wall 21.3 feet (6.5 meters) high along portions of the eastern and southern fence line. The selection of which noise reduction option to use will be made during final Project design.

Note that mitigation is only required under “ONAF2” conditions with all 48 cooling fans running on both transformers simultaneously. Sound level contours from the collector substation generated from the modeling grid are presented in Figure 7-5.1. This figure represents the mitigated results, along with the potential location of a sound barrier wall if the project elects to use that mitigation option.

The highest mitigated sound levels under this scenario are 35 dBA at a non-participating residence. These sound levels meet the design goal of 35 dBA, assuming the 5 dBA tonal penalty, which is likely for a substation transformer.

Local Requirements

There are no applicable sound level requirements in the Town of Oakfield. The Town of Elba Zoning Law § 413(F)(4)(n) requires that noise levels from the Project comply with the noise limits for solar energy facilities contained in 19 NYCRR § 6.5(b) by implementing the design standards set forth in 19 NYCRR § 900-2.8(b)(2). The Project complies with this provision of the Town of Elba Zoning Law, as further described in Exhibit 24: Local Laws and Ordinances, because the Project meets the design goals referenced in Section (b) of this Exhibit above.

m) Community Noise Impacts

1) Hearing Loss for the Public

The Project’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. The only construction noise source for this Project capable of exceeding the WHO hearing impairment threshold is blasting, but no blasting is anticipated for this Project. All other construction activities will produce noise below the WHO hearing impairment threshold. Therefore, no Project activities have the potential to cause hearing loss to the public.

2) Potential for Structural Damage

At this time, neither blasting nor pile-driving are planned as part of construction for the Project. If blasting or pile-driving become necessary, a detailed discussion of the potential to produce structural damage on any existing proximal buildings is found in Exhibit 10: *Geology, Seismology and Soils* of this Application.

n) Noise Abatement Measures for Construction Activities

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; 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 best management practices 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 HDD will be limited to daytime hours.
- Pursuant to 19 NYCRR § 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 OSHA requirements.
- Developing a staging plan that establishes equipment and material staging areas away from sensitive receptors when feasible.
- Contractors shall 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 Project have the potential to occur. If complaints do arise, the Complaint Management Plan provides 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 Project or complaint type. In accordance with 19 NYCRR § 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 19 NYCRR § 6.2(k)(2), which includes responding to noise and vibration complaints according to the complaint resolution protocol approved by ORES.

3) Compliance with Local Laws

Pursuant to 19 NYCRR § 6.2(k)(3), the Applicant will comply with the substantive provision of the Town of Elba's Zoning Law by meeting the design goals described in Section (b) of this Exhibit above. There are no applicable sound level requirements in the Town of Oakfield.

o) Noise Abatement Measures for Facility Design and Operation

1) Wind Facilities

The requirements of this subpart do not apply to the Project.

2) Solar Facilities

Adverse noise impacts will be avoided or minimized through careful siting of Project components. The noise emitted by a solar project is limited to daytime periods only for the majority of the components. Noise mitigation in the form of a barrier wall or quieter transformer may be necessary under the current design at the collector substation to meet the Project's noise design goals. Note that mitigation is only required under "ONAF2" conditions with all 48 cooling fans running on both transformers simultaneously. No mitigation is required at any of the central inverters across the Project under the current design.

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

1) GIS Files

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) Computer Noise Modeling Files

The Cadna/A computer noise modeling files have been submitted to ORES by digital/electronic means.

3) Substation Site Plans and Elevation Details

Site plan and elevation details of substations, as related to the location of all relevant noise sources are presented in Appendix 7-A.6: *Collector Substation Layout*.

4) Wind Facilities

The requirements of this subpart do not apply to the Project.

5) Solar Facilities

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

ii) Sound information from the manufacturers for all noise sources included in this analysis are presented in Appendix 7-A.7: *Manufacturer Sound Level Data Sheets*.

q) Miscellaneous

1) Glossary of Terms, Definitions, Abbreviations, and References

A glossary of terms, definitions, and abbreviations used and references cited throughout are included with this Exhibit.

2) Table Format

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 correspond 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 (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 1-dBA bins).

EXHIBIT 7: NOISE AND VIBRATION

Matter No. 21-1108

References

American National Standard ANSI/ASA S1.4-1983 (R2006). 1983. *Specification for Sound Level Meters.*

American National Standard ANSI/ASA S1.11-2004 (R2009). 2004. *Specification for Octave-Band and Fractional-Octave-Band Analog and Digital Filters.*

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American National Standard ANSI/ASA S3/SC1.100-2014 & ANSI/ASA S12.100-2014. 2014. *Methods to Define and Measure the Residual Sound in Protected Natural and Quiet Residential Areas.*

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International Standard ISO 9613-2. 1996. *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation.*

U.S. DOT, Federal Highway Administration (FHWA). 2006. *FHWA Roadway Construction Noise Model User's Guide.*

World Health Organization (WHO). 1999. *Guidelines for Community Noise.*

FIGURES

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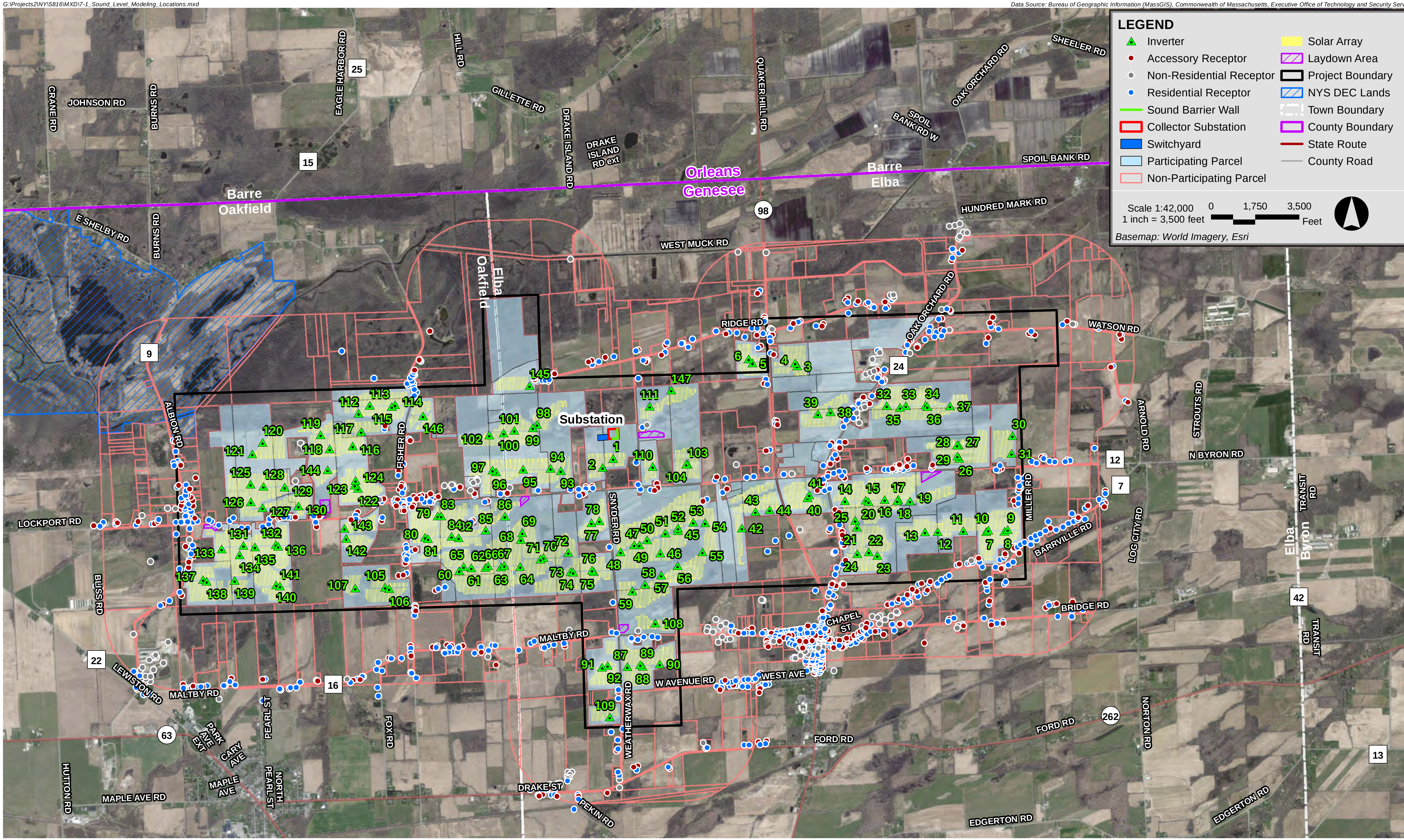
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cider Solar   Genesee County, New York

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Figure 7-1

Sound Level Modeling Locations

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

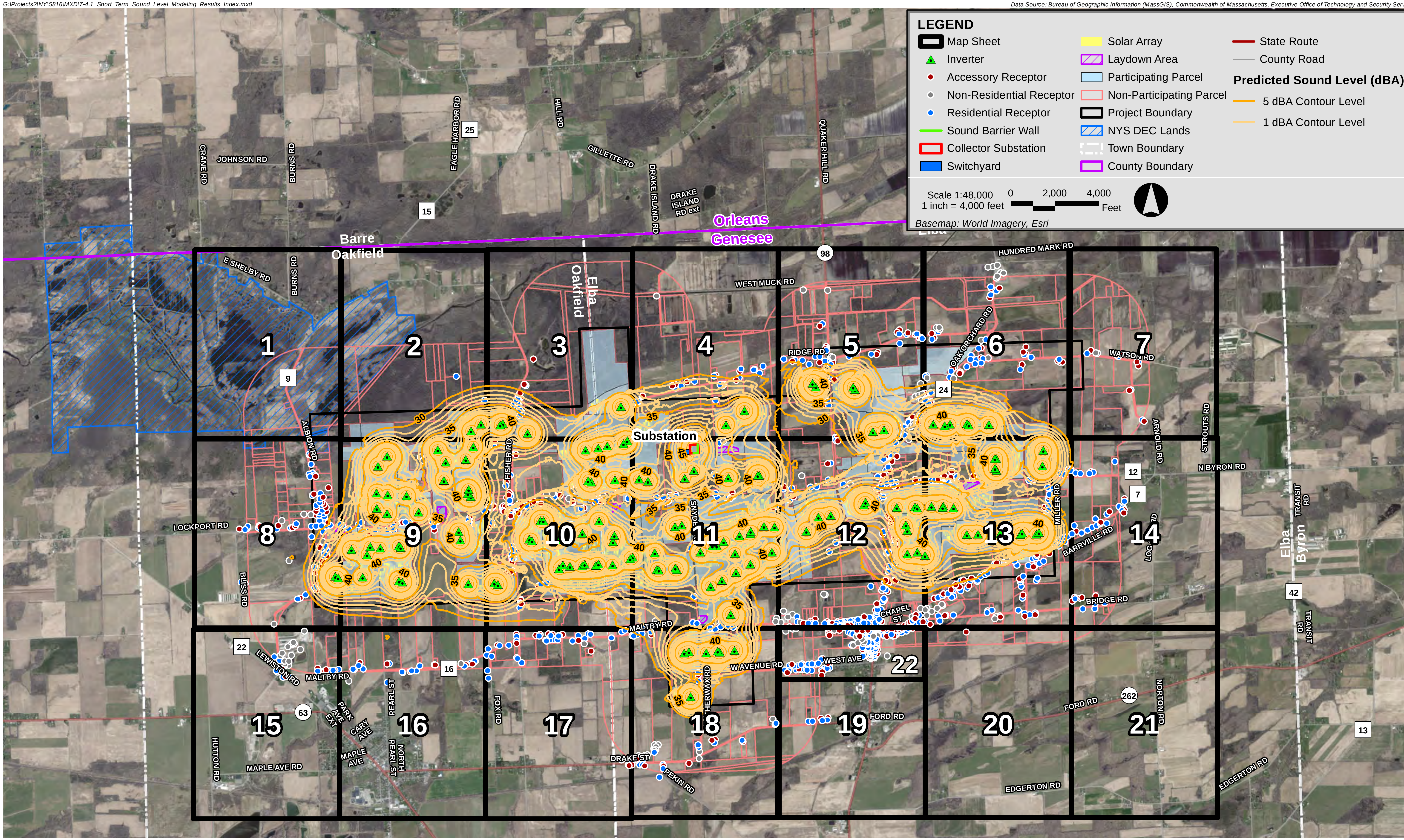

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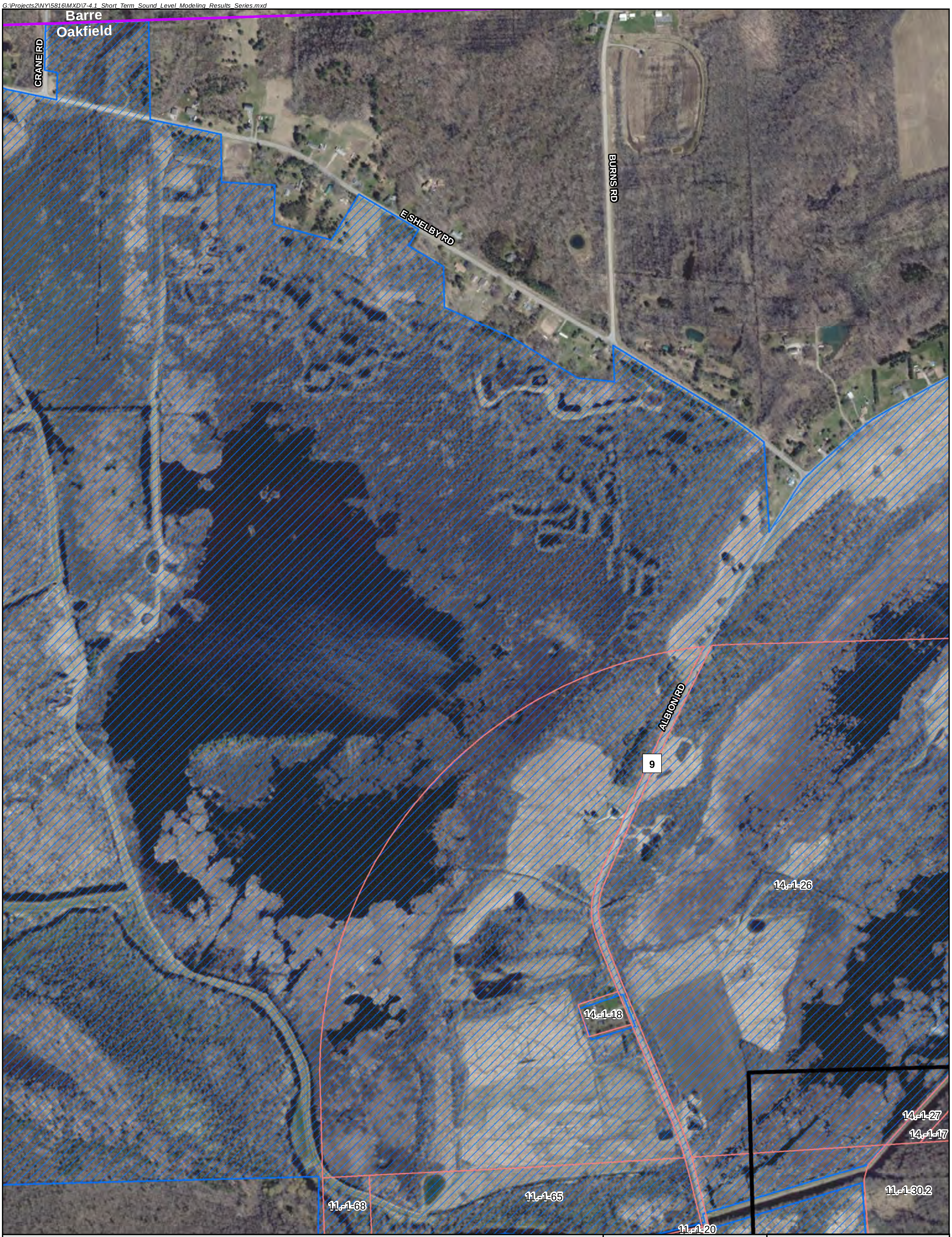
Figure 7-4.1, Index

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



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet
0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

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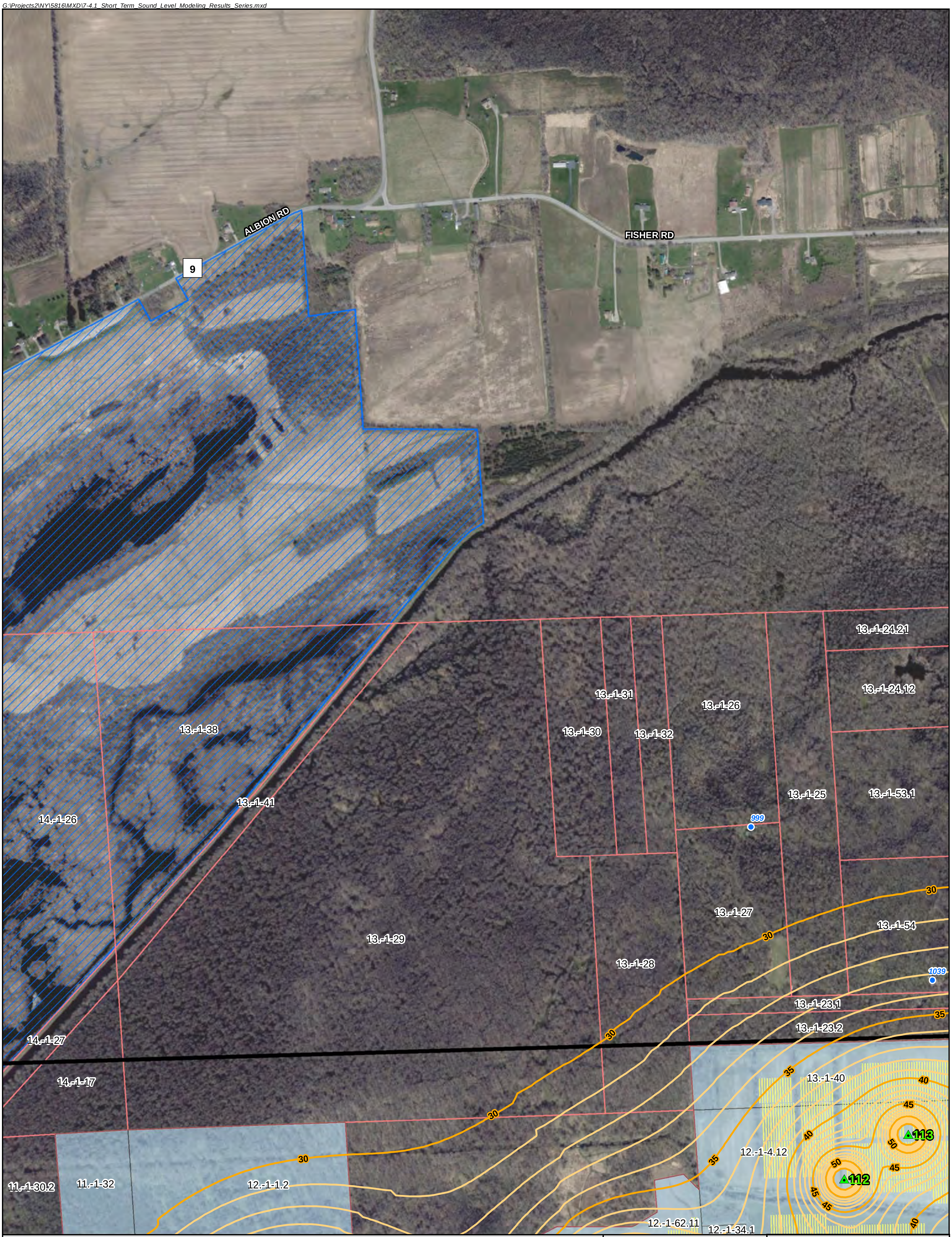
Figure 7-4.1, Map 1 of 22

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



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

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Figure 7-4.1, Map 2 of 22

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

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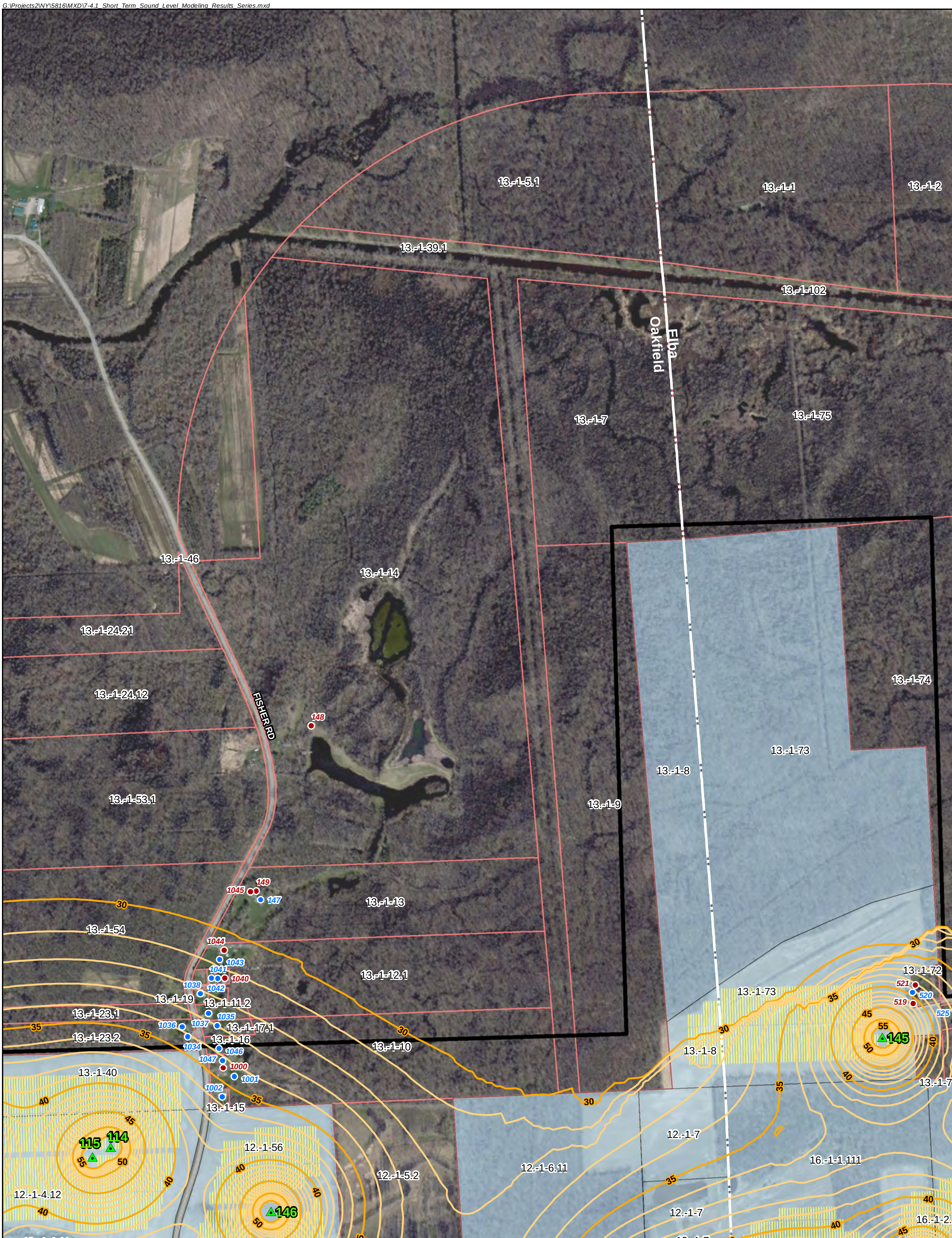

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

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15	16	17	18	19	20	21

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Figure 7-4.1, Map 3 of 22

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

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

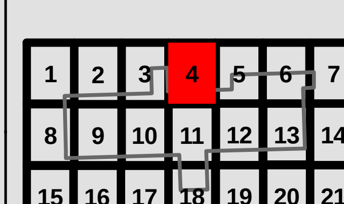

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Figure 7-4.1, Map 4 of 22

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

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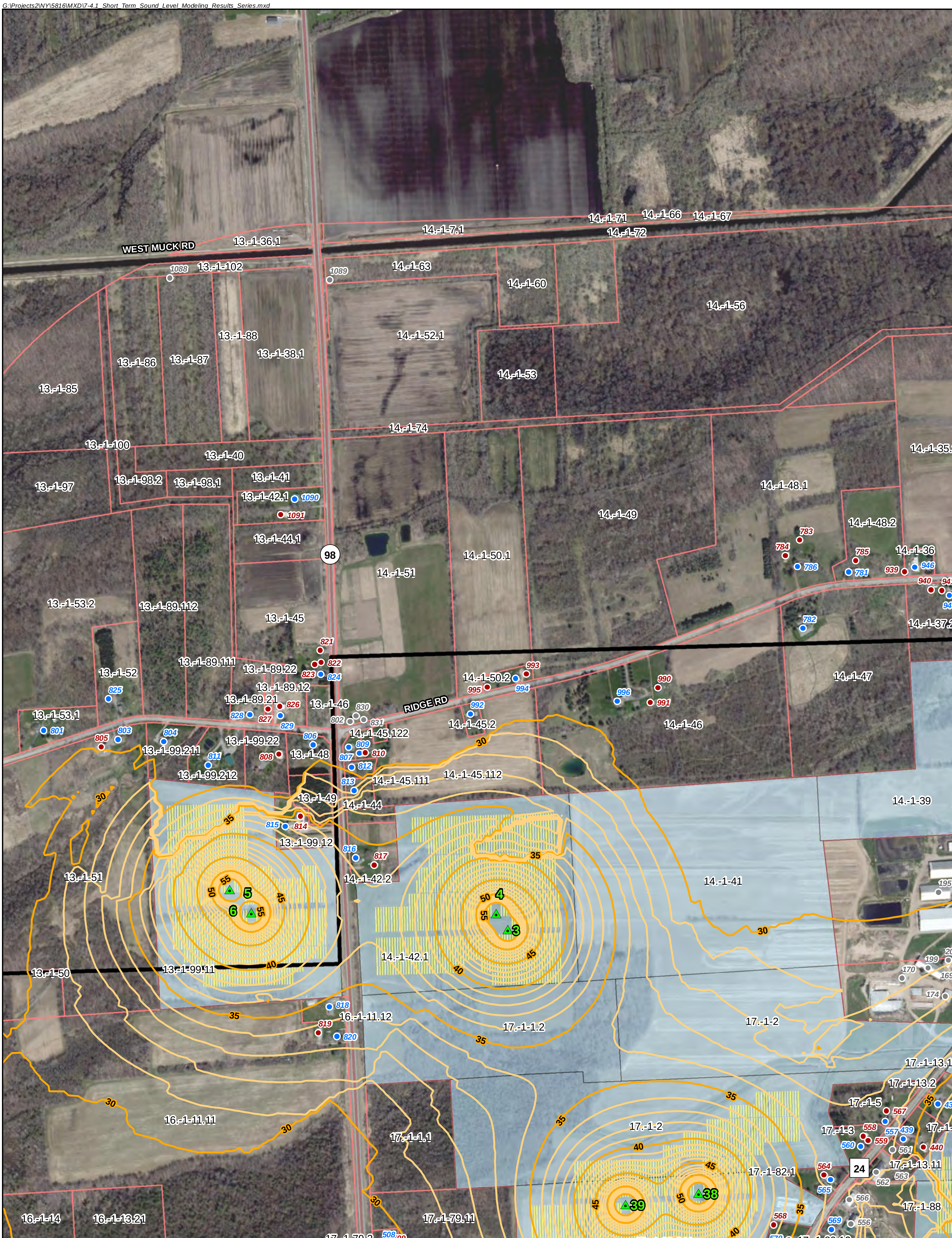

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

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Figure 7-4.1, Map 5 of 22

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

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LEGEND

Inverter	Solar Array
Accessory Receptor	Laydown Area
Non-Residential Receptor	Participating Parcel
Residential Receptor	Non-Participating Parcel
Sound Barrier Wall	Project Boundary
Collector Substation	NYS DEC Lands
Switchyard	Town Boundary

County Boundary
State Route
County Road

Predicted Sound Level (dBA)

5 dBA Contour Level
1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet
0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1 2 3 4 5 6 7
8 9 10 11 12 13 14
15 16 17 18 19 20 21

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Figure 7-4.1, Map 6 of 22

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

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

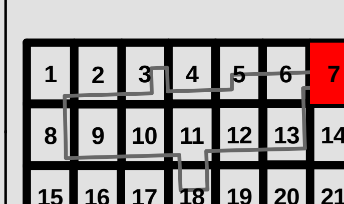

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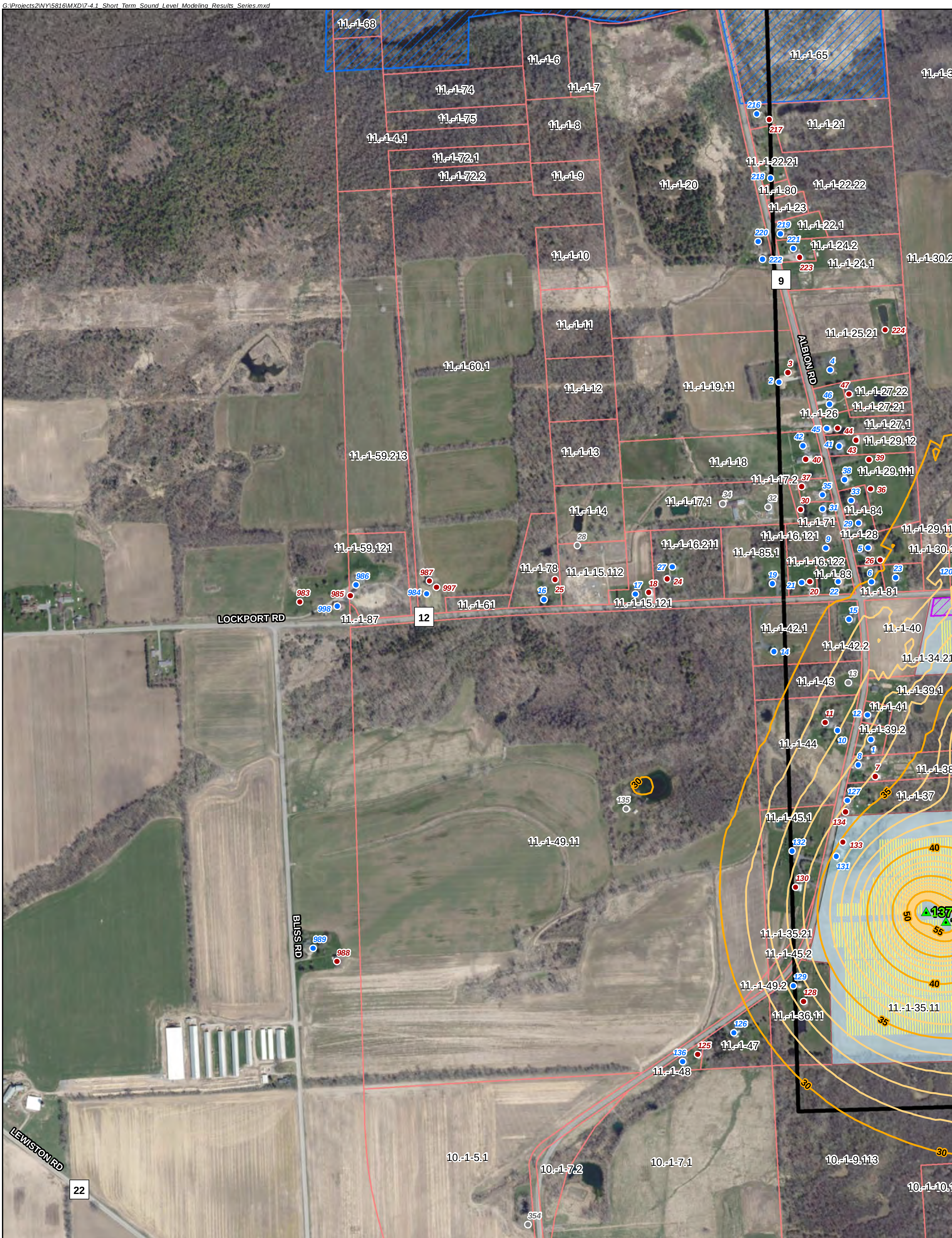
Figure 7-4.1, Map 7 of 22

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



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar **Genesee County, New York**

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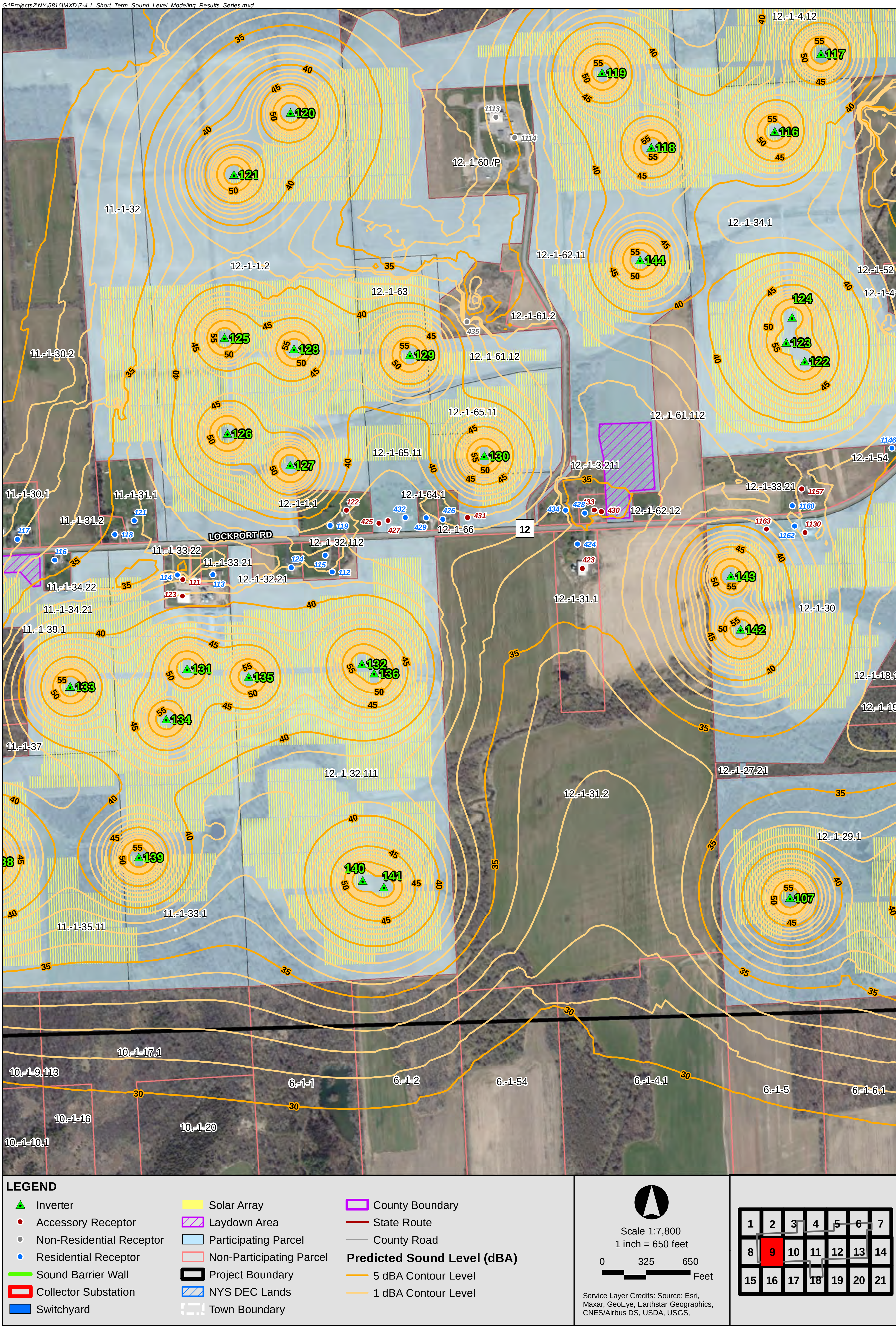
Figure 7-4.1, Map 8 of 22

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



Cider Solar Genesee County, New York

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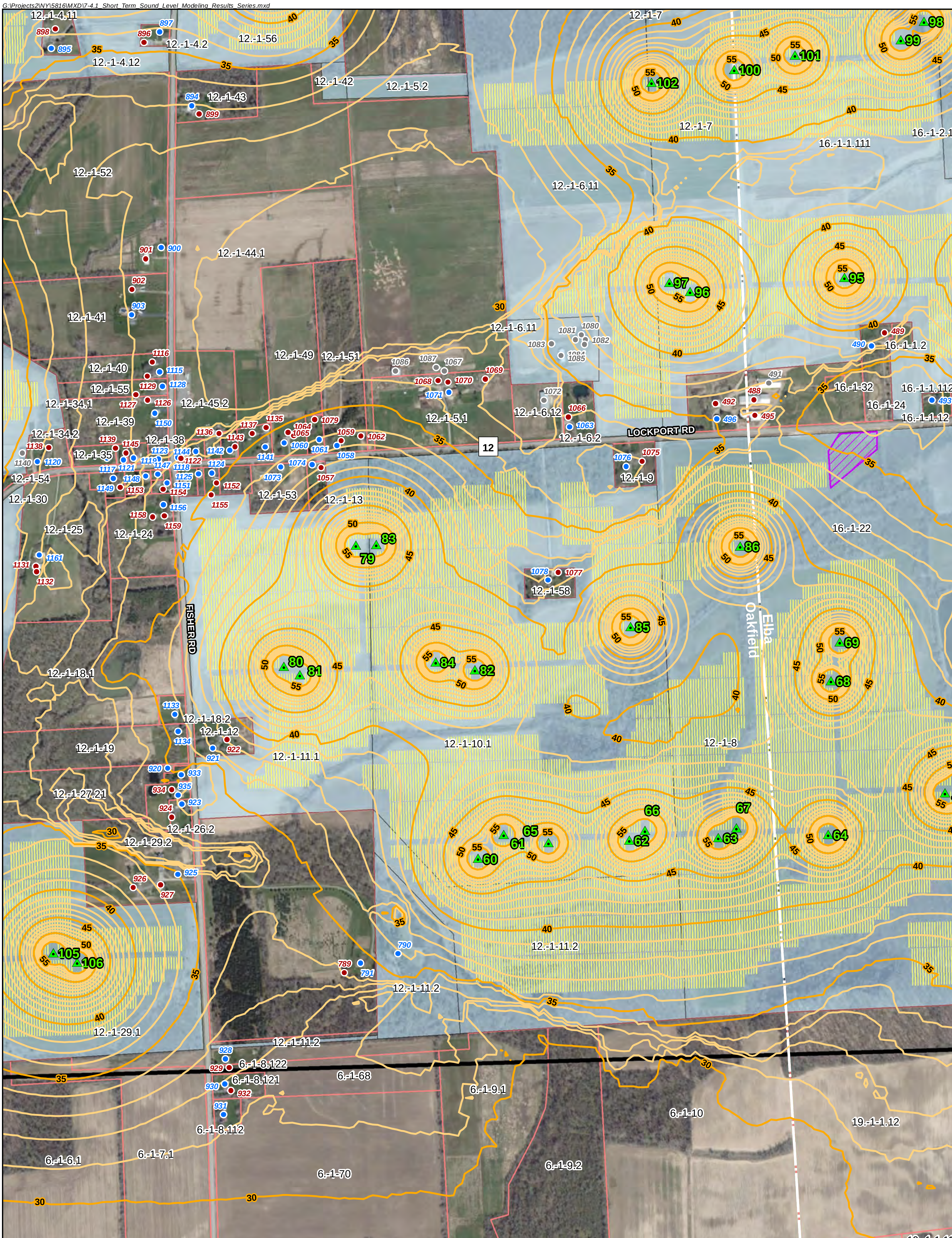
Figure 7-4.1, Map 9 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

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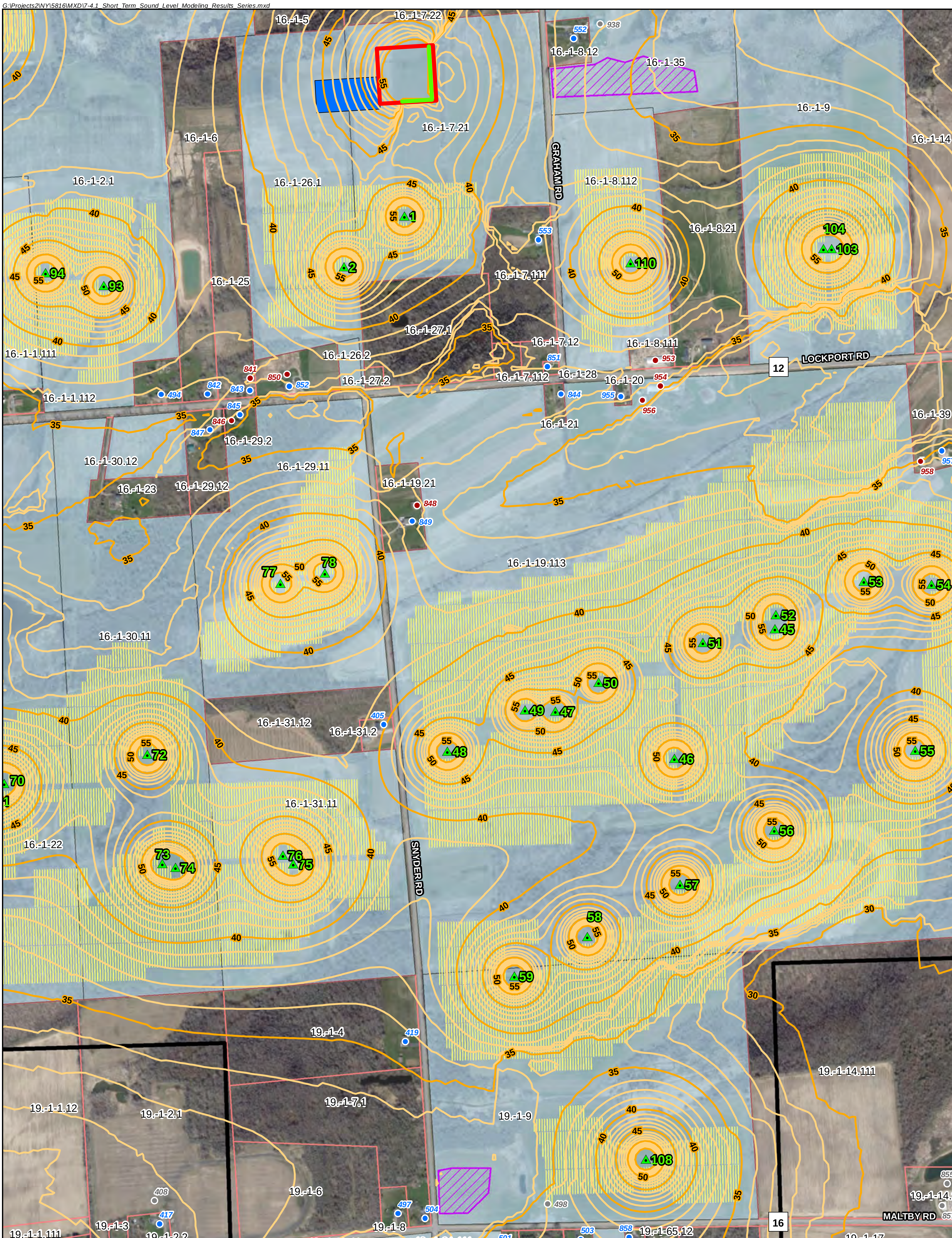
Figure 7-4.1, Map 10 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar **Genesee County, New York**

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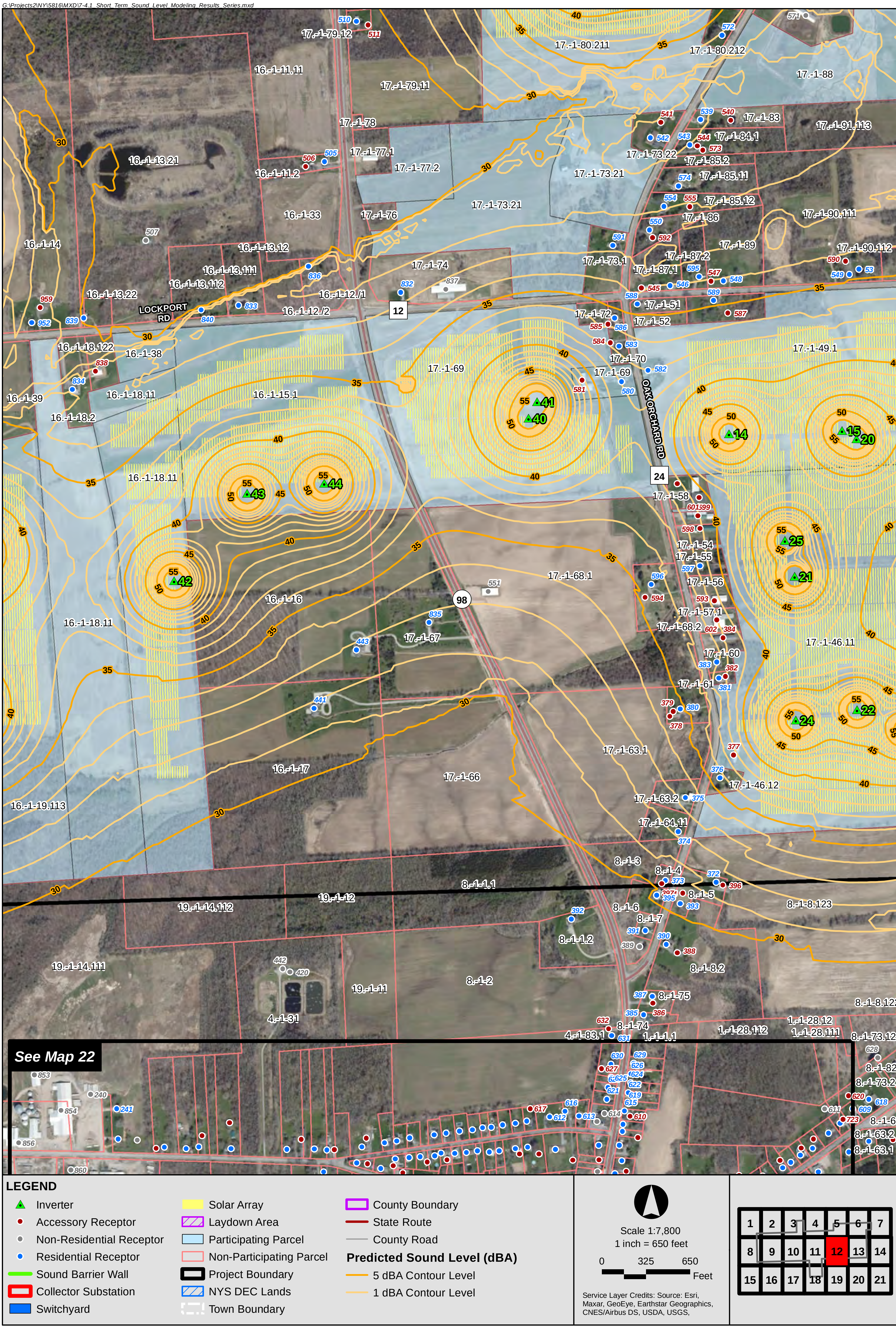
Figure 7-4.1, Map 11 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd



Cider Solar Genesee County, New York

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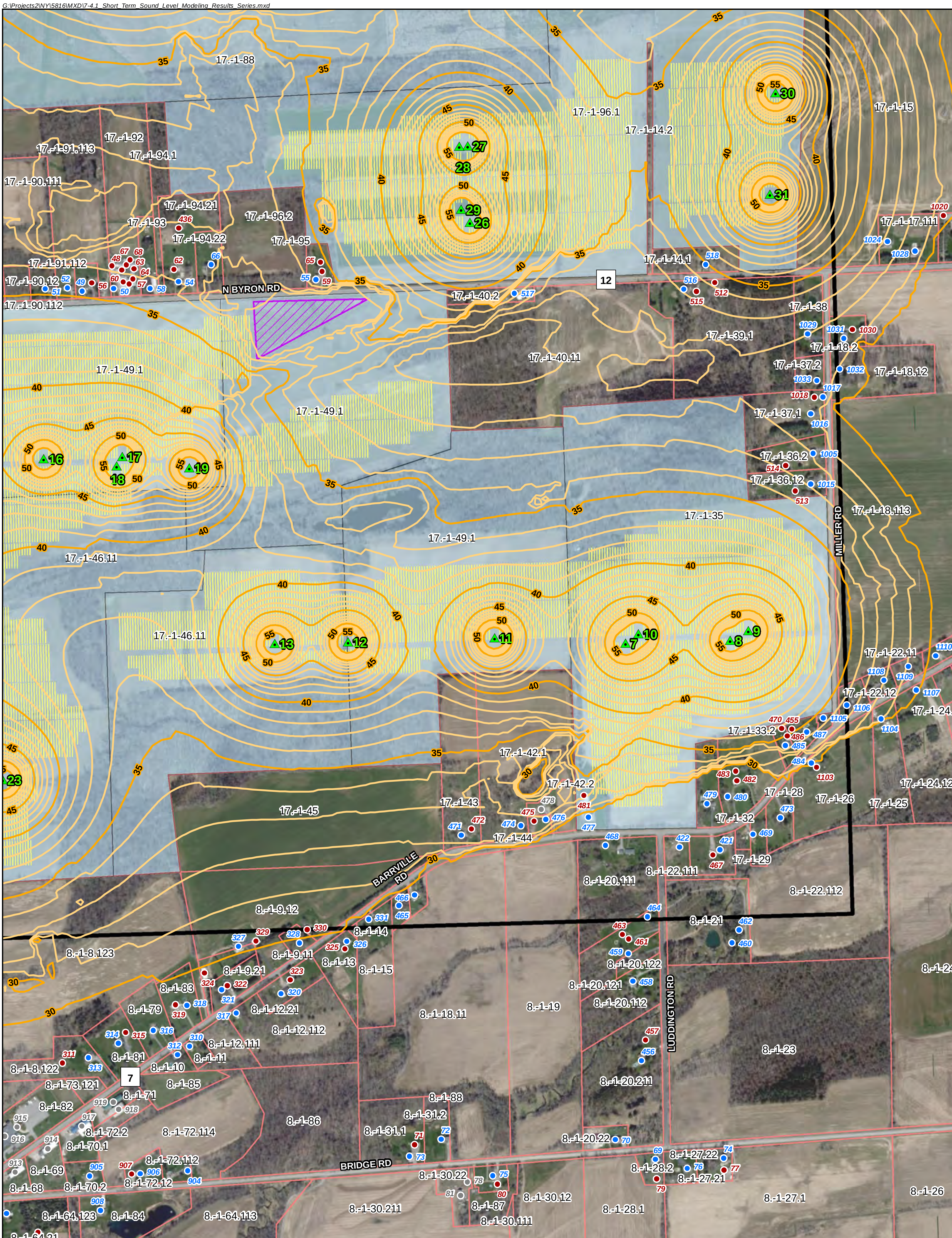
Figure 7-4.1, Map 12 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet
0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

Epsilon Associates Inc.

Figure 7-4.1, Map 13 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd

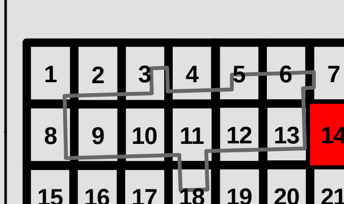
LEGEND

Inverter	Solar Array	County Boundary
Accessory Receptor	Laydown Area	State Route
Non-Residential Receptor	Participating Parcel	County Road
Residential Receptor	Non-Participating Parcel	**Predicted Sound Level (dBA)**
Sound Barrier Wall	Project Boundary	5 dBA Contour Level
Collector Substation	NYS DEC Lands	1 dBA Contour Level
Switchyard	Town Boundary	

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,



Cider Solar **Genesee County, New York**

Epsilon ASSOCIATES INC.

Figure 7-4.1, Map 14 of 22

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

LEGEND

Inverter	Solar Array	County Boundary
Accessory Receptor	Laydown Area	State Route
Non-Residential Receptor	Participating Parcel	County Road
Residential Receptor	Non-Participating Parcel	**Predicted Sound Level (dBA)**
Sound Barrier Wall	Project Boundary	5 dBA Contour Level
Collector Substation	NYS DEC Lands	1 dBA Contour Level
Switchyard	Town Boundary	

Scale 1:7,800
1 inch = 650 feet

0 325 650
Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

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Figure 7-4.1, Map 15 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet
0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

Epsilon ASSOCIATES INC.

Figure 7-4.1, Map 16 of 22

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

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

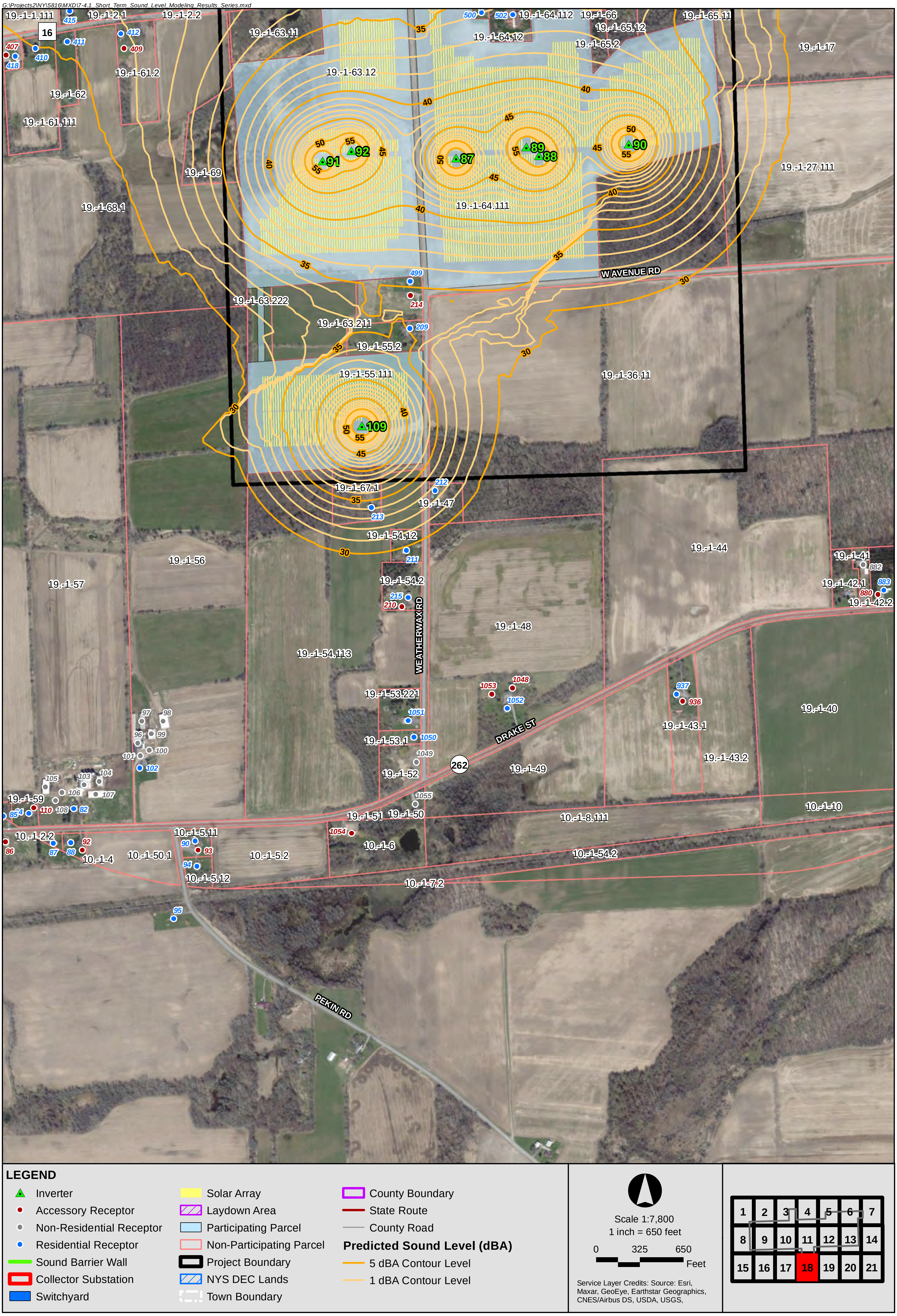
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

Epsilon ASSOCIATES INC.

Figure 7-4.1, Map 17 of 22

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



Cider Solar **Genesee County, New York**

Figure 7-4.1, Map 18 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd

LEGEND

Inverter	Solar Array	County Boundary
Accessory Receptor	Laydown Area	State Route
Non-Residential Receptor	Participating Parcel	County Road
Residential Receptor	Non-Participating Parcel	**Predicted Sound Level (dBA)**
Sound Barrier Wall	Project Boundary	5 dBA Contour Level
Collector Substation	NYS DEC Lands	1 dBA Contour Level
Switchyard	Town Boundary	

Scale 1:7,800
1 inch = 650 feet
0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

Epsilon Associates Inc.

Figure 7-4.1, Map 19 of 22

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

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:7,800
1 inch = 650 feet

0 325 650 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

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Figure 7-4.1, Map 20 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Series.mxd

LEGEND

Inverter	Solar Array	County Boundary
Accessory Receptor	Laydown Area	State Route
Non-Residential Receptor	Participating Parcel	County Road
Residential Receptor	Non-Participating Parcel	**Predicted Sound Level (dBA)**
Sound Barrier Wall	Project Boundary	5 dBA Contour Level
Collector Substation	NYS DEC Lands	1 dBA Contour Level
Switchyard	Town Boundary	

Scale 1:7,800
1 inch = 650 feet

0 325 650
Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21

Cider Solar Genesee County, New York

Epsilon ASSOCIATES INC.

Figure 7-4.1, Map 21 of 22

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

G:\Projects2\NY\5816\MXD\7-4.1_Short_Term_Sound_Level_Modeling_Results_Map22.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- Town Boundary
- County Boundary
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:4,200
1 inch = 350 feet

0 175 350 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

Cider Solar Genesee County, New York

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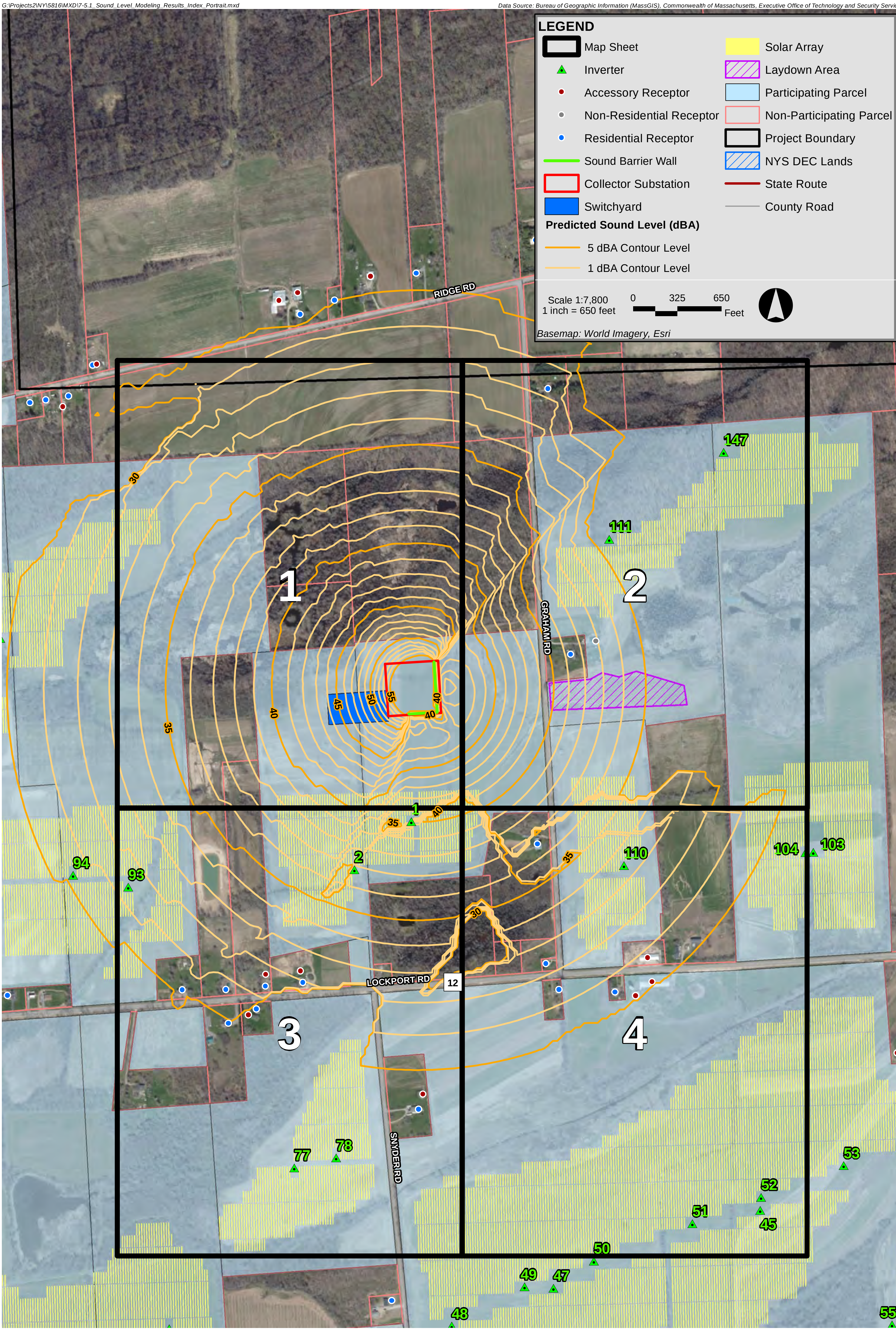
Figure 7-4.1, Map 22 of 22

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

G:\Projects2\NY\5816\MXD\7-5.1_Sound_Level_Modeling_Results_Index_Portrait.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

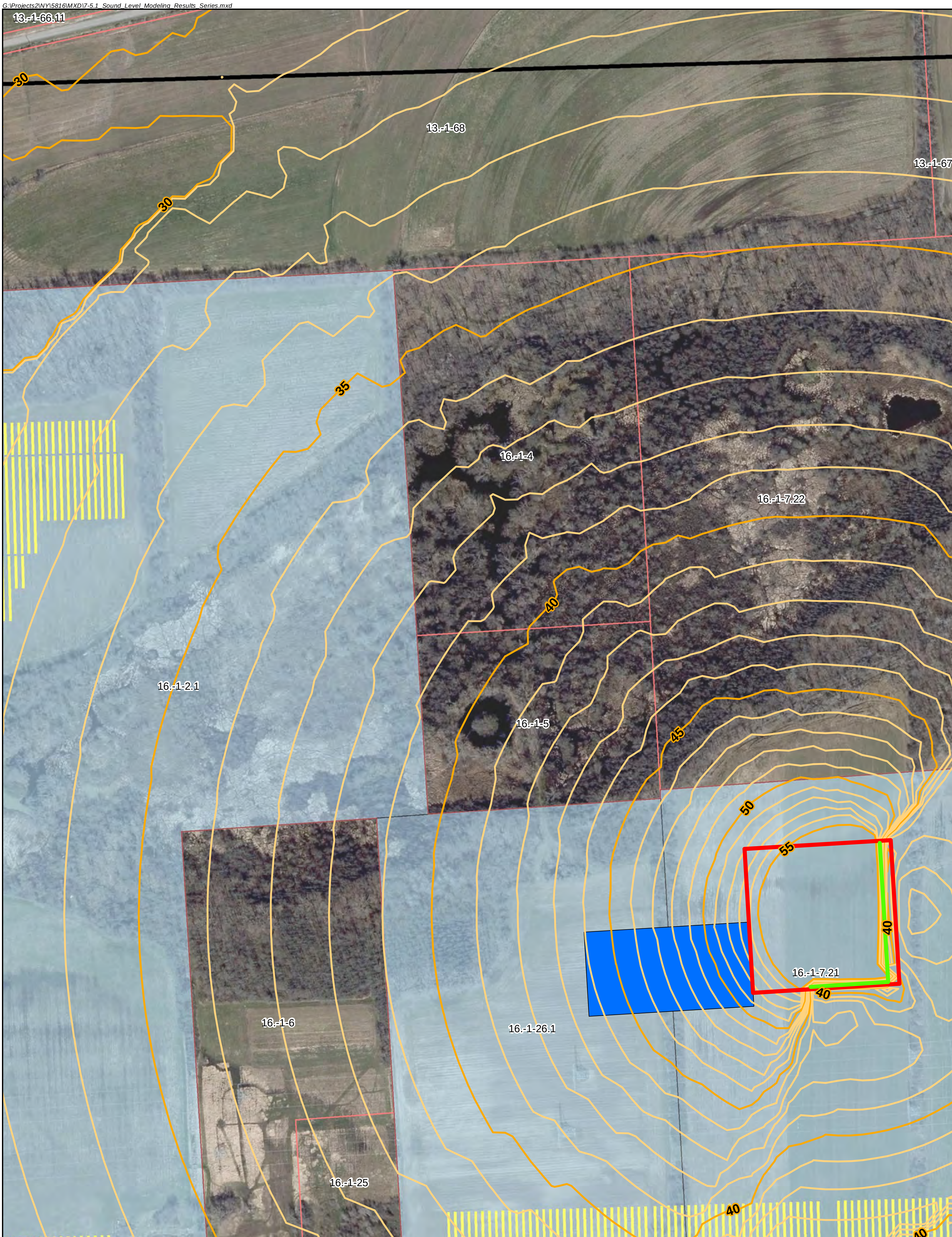


Cider Solar **Genesee County, New York**

Figure 7-5.1, Index

Collector Substation L_{eq} (1-Hr) Mitigated Sound Level Modeling Results

G:\Projects2\NY\5816\MXD\7-5.1_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,000
1 inch = 250 feet

0 125 250 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2
3	4

Cider Solar Genesee County, New York

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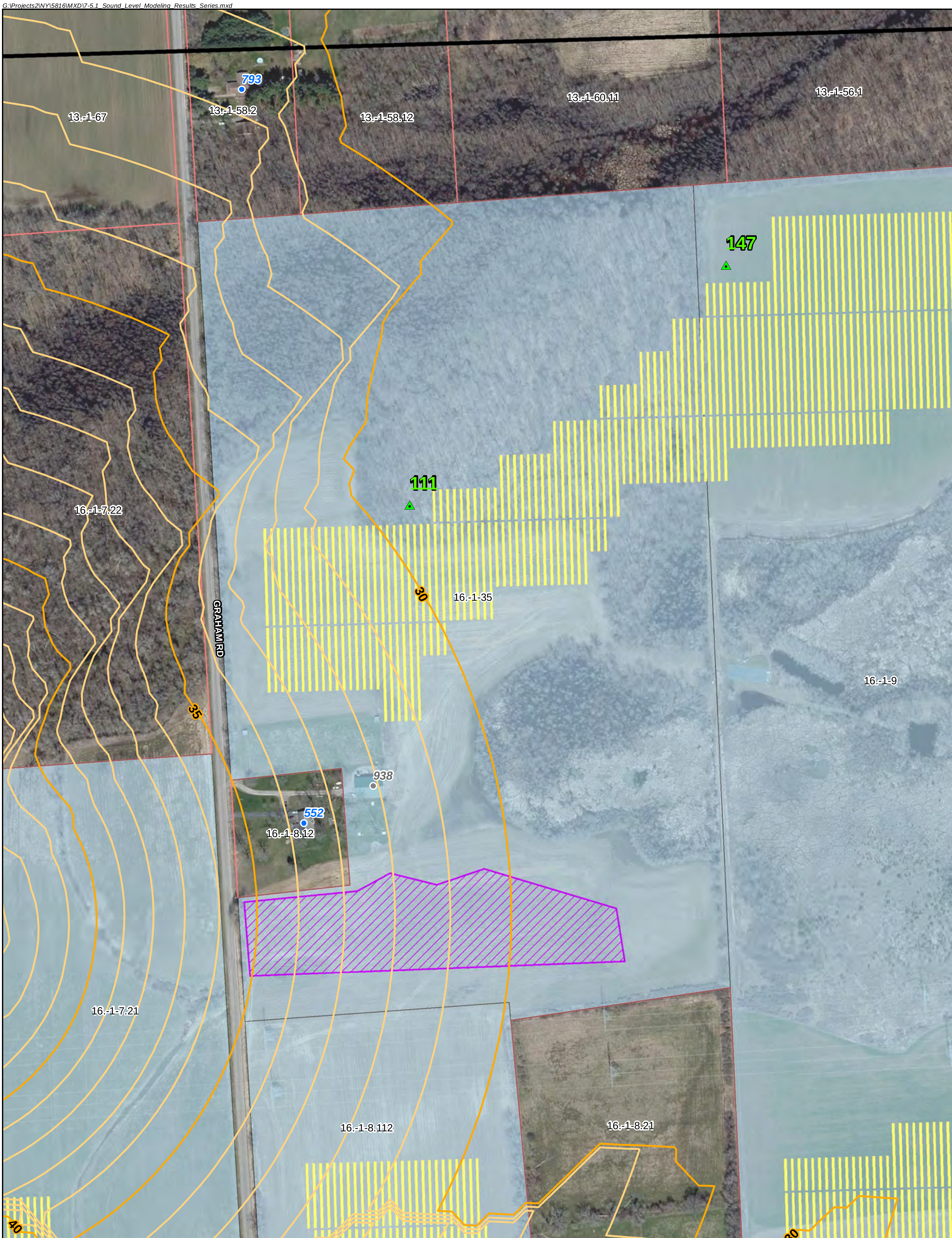
Figure 7-5.1, Map 1 of 4

Collector Substation L_{eq} (1-Hr) Mitigated Sound Level Modeling Results

G:\Projects2\NY\5816\MXD\7-5.1_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,000
1 inch = 250 feet
0 125 250
Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2
3	4

Cider Solar Genesee County, New York

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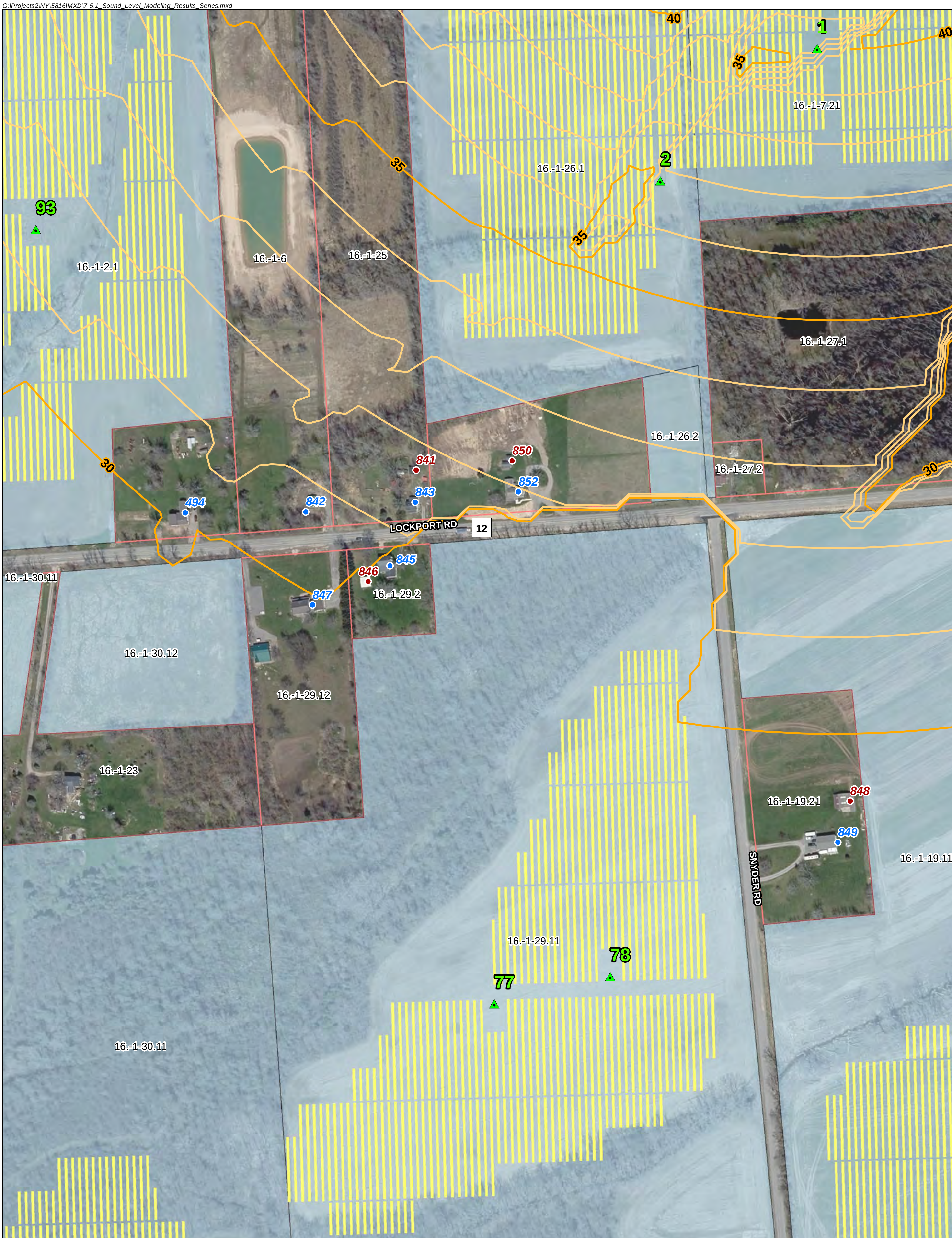
Figure 7-5.1, Map 2 of 4

Collector Substation L_{eq} (1-Hr) Mitigated Sound Level Modeling Results

G:\Projects2\NY\5816\MXD\7-5.1_Sound_Level_Modeling_Results_Series.mxd



LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,000
1 inch = 250 feet

0 125 250 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2
3	4

Cider Solar Genesee County, New York

Epsilon ASSOCIATES INC.

Figure 7-5.1, Map 3 of 4

Collector Substation L_{eq} (1-Hr) Mitigated Sound Level Modeling Results

G:\Projects2\NY\5816\MXD\7-5.1_Sound_Level_Modeling_Results_Series.mxd

LEGEND

- Inverter
- Accessory Receptor
- Non-Residential Receptor
- Residential Receptor
- Sound Barrier Wall
- Collector Substation
- Switchyard
- Solar Array
- Laydown Area
- Participating Parcel
- Non-Participating Parcel
- Project Boundary
- NYS DEC Lands
- State Route
- County Road

Predicted Sound Level (dBA)

- 5 dBA Contour Level
- 1 dBA Contour Level

Scale 1:3,000
1 inch = 250 feet
0 125 250 Feet

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,

1	2
3	4

Cider Solar **Genesee County, New York**

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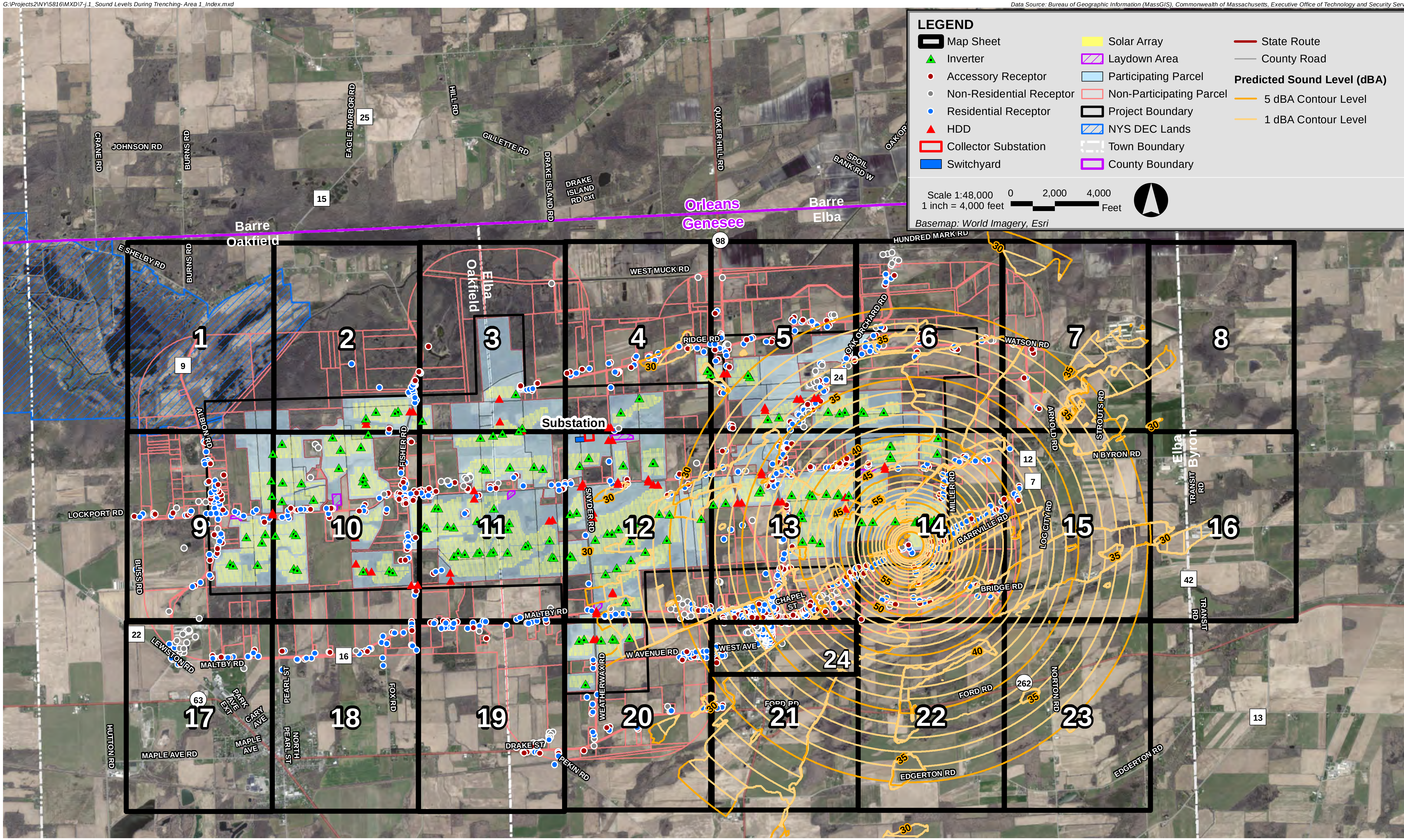
Figure 7-5.1, Map 4 of 4

Collector Substation L_{eq} (1-Hr) Mitigated Sound Level Modeling Results

G:\Projects2\NY\5816\MXD\7-j.1_Sound Levels During Trenching- Area 1_Index.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Cider Solar Genesee County, New York

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Figure 7-j.1, Index

Sound Levels During Trenching- Area 1