Summer Shade Solar Project
Limited Noise Assessment
Metcalfe County, KY

March 18, 2025

Prepared for:
Summer Shade Solar, LLC
500 Sansome Street
San Diego, California 94111-3211

Prepared by:
Stantec Consulting Services, Inc.

Project Number: 172658275

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Abbreviations

AC	Alternating current
BESS	Battery energy storage system
dB	Decibel (Unweighted)
dBA	Decibel (A-weighted)
DC	Direct current
Hz	Hertz
kV	Kilovolt
L_{eq}	Equivalent sound level
L_{max}	Maximum sound level
MVA	Megavolt ampere
MW	Megawatt
Project	Summer Shade Solar Project
PV	Photovoltaic
PWL (or L_w)	Sound Power Level
SPL (or L_p)	Sound Pressure Level

March 18, 2025

1.0 Introduction

Summer Shade Solar, LLC (Summer Shade Solar) is preparing an application to construct and place in utility service the Summer Shade Solar Project (Project). The Project will include an approximately 106 megawatt (MW) alternating current (AC) nameplate capacity solar energy facility and an approximately 424 MW AC battery energy storage system (BESS) facility.

Stantec Consulting Services Inc. (Stantec) completed an operational sound assessment. Operational noise modeling was completed to predict the expected sound generated from the proposed solar inverter stations, substation transformer, and BESS equipment at nearby noise-sensitive receptor locations. The estimated daytime and nighttime project operational sound levels were compared to applicable noise regulations. In addition, Project operational sound levels were compared to a Project noise goal. Construction noise was also analyzed and compared to applicable regulations. This report documents the methodology, results, and conclusions of the Project pre-construction sound assessment.

2.0 Terminology

Sound is caused by vibrations that generate waves of minute pressure fluctuations in the surrounding air. Sound levels are measured using a logarithmic decibel (dB) scale. Noise is typically defined as unwanted sound.

Human hearing ranges from 20 to 20,000 Hz. Human hearing varies in sensitivity for different sound frequencies, and the frequency sensitivity changes based on the overall sound level. The ear is most sensitive to middle frequency sounds between 800 and 8,000 Hertz (Hz) and is least sensitive to low and high frequency sounds below 400 Hz or above 12,500 Hz, respectively. Consequently, several different frequency weighting networks have been used to approximate the way the human ear responds various frequencies at different sound levels. Of most common use is the A-weighting network. A-weighting discriminates against frequency sounds similar to the response of the human ear at the low to moderate sound levels typical of environmental sources. A-weighted decibels, or dBA, is most widely used for regulatory requirements. Sound levels without a frequency weighting applied, referred to as unweighted or linear, are generally reported as dB.

Broadband (overall) sound levels, which are expressed as a single number in decibels, account for acoustical energy across the frequency spectrum, including energy at low, middle, and high frequencies. To assess how much acoustical energy is present in different ranges of the frequency spectrum, sound can be separated into spectral (frequency) components using octave band filters. For environmental noise assessments, octave band sound levels are often expressed in unweighted decibels (dB) at octave band center frequencies from 31.5 to 8,000 Hz.

Environmental sound is variable in time; therefore, it is appropriate to analyze sound levels statistically. Numerous metrics and indices have been developed to quantify the temporal characteristics (changes over time) of environmental noise. A common metric for assessing environmental noise is the equivalent sound level, or L_{eq}. The L_{eq} is a metric that corresponds to the average, or equivalent, sound level over a defined period of time. Other common metrics include the maximum and minimum sound levels, L_{max} and L_{min}, respectively. L_{max} is the highest sound level that occurred during a period of time, while L_{min} is the lowest sound level during a period of time. The L_{max} is particularly useful for evaluating high level, impulsive noise events; L_{min} is useful for understand low sound levels in an area.

The sound power level (PWL or L_w) of a noise source is related to the acoustic energy that the source emits regardless of the environment in which it is placed (i.e., similar to the wattage of a light bulb). Sound power is a property of the source and, therefore, is independent of distance. The radiating sound power then produces a sound pressure level (SPL or L_p) at a point of which human beings can perceive as audible sound. The sound pressure level is dependent on the acoustical environment (e.g., indoor, outdoor, absorption, reflections) and the distance from the noise source. Unless otherwise stated, sound levels in this report refer to sound pressure levels.

A change in sound levels of 3 decibels is generally considered to be the threshold of perception, whereas a change of 5 decibels is clearly perceptible, and a change of 10 decibels is perceived as a doubling or halving of loudness. Each time the number of noise sources is doubled or halved, logarithmic addition (or subtraction) of decibels results in a 3 decibel change in sound levels.

Typical sound levels generated by common sources are shown on **Figure 1**.

3.0 Project Description

The Project is a proposed 106 MW photovoltaic (PV) solar power energy generating facility located in Metcalfe County, Kentucky. The project site is located on approximately 1,535 acres west of the intersection of Kentucky Route 90 and Kentucky Route 163. The Project will be constructed primarily on agricultural and wooded land that is roughly split into three sections. The northern section is north of Kentucky Route 90. Note that an existing electrical substation borders the northern portion of the Project along Kentucky Highway 90. The center section spans from Kentucky Route 90 to Apple Grove Road, while the southern section is south of Apple Grove Road. The land use surrounding the Project Area is mixed between agricultural uses and residential uses. The location of the Project within the County and State are shown on **Figure 2**.

The Project will consist of inverters, a utility interconnection substation, and a BESS facility. Major components of the Project include solar arrays, solar inverter stations, a Project substation with an associated transformer, BESS inverters, and BESS containers. The Project layout, the surrounding area, and nearby noise-sensitive receptors are shown on **Figure 3.** Noise-sensitive receptors include nearby residences, schools, churches, hospitals, parks, and cemeteries. Arrays of photovoltaic modules will be mounted on fixed-tilt racking systems arranged in rows. Power conversion systems (also called inverter stations) will be distributed throughout the Project area, comprised of one distribution transformer and a series of power inverters. The proposed Project substation will be adjacent to the existing substation to the northwest. The power generated by the proposed solar facility will be connected to the existing power grid. The proposed BESS facility, which consist of BESS inverters and BESS containers, is located approximately 265 feet north of the proposed Project substation. The BESS facility has the ability to store power to distribute when needed on the existing power grid.

Solar panels produce direct current (DC) voltage which must be converted to AC voltage through a series of inverters. Solar energy facilities operate by converting solar radiation into electricity, meaning the solar generation portion of the Project will only produce electricity between sunrise and sunset. After sunset, the site no longer receives solar radiation, and the solar inverters will shift into stand-by mode and generate minimal noise. The Project will include a step-up power transformer located within the substation footprint. The substation transformer is generally expected to operate at full capacity during daylight hours when the solar array will be generating power and in standby mode during nighttime hours. The Project BESS facility is anticipated to operate at full capacity during some daytime and nighttime hours. However, BESS equipment is not expected to operate at full capacity continuously during those periods. To be conservative, the Project substation transformer and BESS equipment were assumed to operate during the nighttime hours for this sound assessment.

The main sources of operational sound levels from the Project will be the solar array inverter stations, the substation transformer, BESS inverters, and BESS containers. Project equipment assessed includes 25 solar inverter stations within the solar array areas, one power transformer within the Project substation area, and 24 BESS inverters with 96 BESS containers. Each BESS container will have four BESS enclosure units within it.

Construction activities will also produce noise that needs to be evaluated. Activities that will occur during the construction of the Project include impact pile driving and the use of heavy construction equipment. The loudest sound levels during construction activities are expected to be from impact pile driving. The impact pile driving equipment will be used to install the solar array posts, while other construction equipment will be used to install the remaining facility components. Construction activities are expected to be limited to daytime hours.

4.0 Regulatory Environment / Criteria

A review was conducted of noise regulations applicable to the Project at the federal, State, and County levels. There are no federal environmental noise requirements that are applicable to this Project.

Kentucky Revised Statutes (KRS) Section 278.708 requires a site assessment report be completed for proposed electric generation facilities that includes “evaluation of sound levels expected to be produced by the facility” (*KRS 278.708(3)(a)8*) and “evaluation of anticipated peak and average sound levels associated with the facility’s construction and operation at the property boundary" (*KRS 278.708(3)(d)*). Quantifiable noise limits are not provided in KRS 278.708. This sound assessment was completed to address the above requirements.

No Metcalfe County noise regulations or limits that are applicable to the Project were identified.

Since there are no quantitative noise limits identified in any jurisdiction, it is appropriate to recommend a Project goal to minimize the impact of noise on nearby noise-sensitive receptors. Due to the rural nature of the surrounding area, a Project noise goal of 55 dBA during the daytime and 50 dBA during the nighttime at residential structures is recommended for operational Project sound. These sound levels are similar to and consistent with noise regulation limits commonly found around the United States. Meeting these sound levels will reduce the impact of Project noise on nearby receptors.

5.0 Existing Noise Conditions

5.1 NOISE SENSITIVE RECEPTORS

In this analysis, noise-sensitive receptors were considered to include residences, schools, churches, hospitals, parks, and cemeteries. Noise-sensitive receptor locations were identified within 2,000 feet of the Project boundaries by reviewing high resolution aerial imagery and structure data. The receptor locations, named with the prefix "R" and shown on **Figures 3 through 5**, include 100 residential dwellings and one church.

There are six sets of residential receptors located within 2,000 feet of the Project boundary that meet the definition of "residential neighborhood" according to KRS 278.700, which includes populated areas of five or more acres containing at least one residential structure per acre. The neighborhoods are listed in **Table 5.1** below.

Table 5.1: Residential Neighborhoods within 2,000 feet of Project

Residential Neighborhood name	Receptors	Approximate Distance from Project Fence (ft)
Summer Shade Road/Cemetery Road	R-55 through R-60	1,200
Summer Shade Road/Mount Moriah Road	R-36 through R-40	1,055
Clifton Smith Road	R-03 through R-07	250
Roy Lee Humes Road	R-27 through R-31	785
Branstetter Park Road	R-35 through R-35	1,911
Old Tompkinsville Road	R-23	1,859

Table 5.2 shows the nearest residential receptor locations to Project boundaries and equipment throughout the Project area.

Table 5.2: Nearest Receptors to the Project

Land use	Nearest Receptor to	Approx. Distance from Fence (ft)	Approx. Distance from Nearest Solar Panel (ft)	Approx. Distance from Nearest Inverter (ft)	Approx. Distance to Substation (ft)	Approx. Distance to BESS equipment (ft)
Residence (R-66)	Substation	1,755	1,805	2,100	1,260	1,685
Residence (R-61)	BESS Equipment	705	760	1,080	1,525	1,525
Residence (R-05)	Solar Inverter	260	320	360	11,515	11,980
Residence (R-42)	Solar Array	140	185	1,695	3,325	3,365

5.2 EXISTING NOISE FROM ADJACENT PROPERTIES

The primary sources of noise from the surrounding area are likely to be vehicle traffic on rural roads and adjacent agricultural activities including, but not limited to, ATVs, farm machinery, irrigation, tractors, and trucks. Kentucky Route 90 and Kentucky Route 163 also contribute to noise in the vicinity of the Project area. Additionally, wildlife (e.g., birds, cattle, insects, and frogs) contribute to the existing acoustical environment.

5.3 EXISTING NOISE ON THE PROJECT SITE

Existing sound sources on the Project site are likely typical of agricultural activities. These sources include ATVs, tractors, and trucks. Rural wildlife noises also contribute to the existing acoustical environment. Typical sound levels in a variety of outdoor environments are shown in **Figure 1**.

6.0 Construction Sound Assessment

6.1 SOUND SOURCES AND ASSESSMENT METHODOLOGY

Construction activities related to the development of the Project will occur over a period of approximately 12 to 18 months. Construction will occur in phases, starting with site preparation activities such as vegetation clearing, installation of stormwater controls, and access road construction. Construction of the Project substation along with the trenching and installation of the underground electrical collection system will likely be occurring concurrently with the solar array installation activities. The construction process is progressive in nature; therefore, several locations may see activity during the same time period, with installation activities then progressing to other array sites.

Construction activities are expected to be limited to daytime hours. Heavy construction equipment, including, but not limited to, backhoes, bulldozers, excavators, and haul trucks, may be present and operational at different points during the first phase of the construction period. The second phase of construction at each array site will include impact pile drivers to install posts for the solar array system. This analysis assumes that up to three pile drivers may be operating simultaneously within a solar array field.

Major components of the Project that require assembly include solar modules, inverters, a Project substation, and a BESS facility. Assembly will occur within the Project site several hundred to thousands of feet from the nearest receptors. Assembly will take place during construction hours and will be of limited duration at any given location within the Project.

Traffic noise is expected to increase temporarily during construction due to the mobilization of labor and materials, equipment and staff moving between sections of the Project, and construction and equipment vehicles entering and leaving the site.

Sound levels from construction equipment will vary by type, age of equipment, and overall condition. Typical construction equipment sound emission levels from the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM) database[1] are presented in **Table 6.1**. These sound levels are representative of typical infrastructure construction equipment and were used for this assessment. Pile driving was modeled assuming an L_{max} sound level of 101 dBA at 50 feet. Other than pile drivers, sound levels associated with the types of equipment expected to be used will vary from approximately 74 to 85 dBA at 50 feet. For comparison, typical sound levels generated by common sources are shown in **Figure 1**.

Table 6.1: Typical Construction Equipment Sound Emission Levels

Equipment Description	Acoustical Use Factor, %	Sound Level at 50 feet, dBA	
		L_{max}	L_{eq}
Backhoe	40	78	74
Compactor (ground)	20	83	76
Compressor (air)	40	78	74
Crane	16	81	73
Dozer	40	82	78
Dump Truck	40	76	72
Excavator	40	81	77
Flat Bed Truck	40	74	70
Front End Loader	40	79	75
Generator	50	81	78
Impact Pile Driver	20	101	94
Paver	50	77	74

[1] FHWA 2006. Roadway Construction Noise Model User's Guide. U.S. Department of Transportation. U.S. Department of Transportation, Federal Highway Administration, FHWA-HEP-05-054, DOT-VNTSCFHWA-05-01. January 2006. https://www.fhwa.dot.gov/environment/noise/construction_noise/rcnm/rcnm.pdf

Equipment Description	Acoustical Use Factor, %	Sound Level at 50 feet, dBA	
		L_{max}	L_{eq}
Pickup Truck	40	75	71
Pneumatic Tools	50	85	82
Pumps	50	81	78
Roller	20	80	73
Tractor	40	84	80
Vibratory Pile Driver	20	101	94
Welder/Torch	40	74	70

Source: FHWA Roadway Construction Noise Model User's Guide.

The FHWA RCNM model was used to assess sound levels during construction at the nearest receptor to solar panel arrays (R-42) where pile driving would occur. RCNM accounts for the attenuation of sound with distance from equipment and estimates both L_{max} and L_{eq} sound levels. Equipment included in the RCNM model predictions included three pile drivers, one crane, one pickup truck, and one front end loader.

6.2 CONSTRUCTION SOUND ASSESSMENT RESULTS

Table 6.2 shows the results of the construction sound modeling at the nearest receptor to Project construction activities (R-42). The table shows the expected loudest instantaneous sound level (L_{max}) as well as the average sound level (L_{eq}) due to multiple pieces of equipment operating simultaneously in a solar field. Because pile drivers will only be used during solar panel post installations, results have been presented both with and without pile drivers in use.

Table 6.2: Estimated Sound Levels at Nearest Receptor (R-42) Due to Construction (Sunrise to Sunset)

Condition	Distance to Solar Array (ft)	Estimated L_{max} Sound Level (dBA)	Estimated L_{eq} Sound Level (dBA)
With pile driver	185	90	88
Without pile driver		69	67

The estimated sound levels of 67 to 90 dBA during construction are received at the nearest noise-sensitive receptor, while construction sound levels are expected to be lower at other identified receptors that are farther away. Note that these sound levels will be produced for a short duration and during only daytime hours.

7.0 Operational Sound Assessment

7.1 SOUND SOURCES AND ASSESSMENT METHODOLOGY

The Project, as currently proposed, includes 25 solar inverter stations within the solar generation arrays, one power transformer within the Project substation area, and 24 BESS inverters with 96 BESS containers as shown in **Figures 3 and 4**. Each BESS container will have four BESS enclosure units within it. These are the primary operational sound sources associated with the Project. The solar arrays associated with the Project include fixed-tilt tracking panels, which does not produce any noise.

The solar inverter stations and BESS inverters were assumed to be a Sungrow SG44000UD inverter station with a PWL of 91 dBA for each inverter station based on manufacturer's sound test data. The Project substation is expected to have a power transformer with a capacity of 106 megavolt amperes (MVA) with an audible sound level of the substation transformer (i.e., NEMA noise rating) of 82 dB. The NEMA TR-1[2] standard and methods in addition to the Edison Electric Institute Electric Power Plant Environmental Noise Guide[3] were then used to estimate the overall and octave band sound power levels. The Project is expected to include 96 Powin Stack 750 battery containers. The manufacturer sound testing data provided octave band sound level data for a single enclosure unit; however, each battery container will include four enclosures. Therefore, four noise sources were modeled for each battery container with the sound level data provided by the manufacturer. Octave band sound power level data for the Project noise sources are shown in **Table 7.1**.

Table 7.1: Equipment Sound Power Levels

Equipment Type	Octave Band Sound Power Level (dB)									Total Sound Power Level (dBA)
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1,000 Hz	2,000 Hz	4,000 Hz	8,000 Hz	
Solar array and BESS inverter stations	90	89	87	83	86	84	87	77	55	91
Substation transformer	102	108	110	105	105	99	94	89	82	106
BESS enclosure unit	64	74	80	79	77	73	68	64	57	78

Sound attenuates between a source and receptor location due to a variety of factors, including but not limited to, distance between source and receptor, atmospheric absorption, ground type, topography, shielding from solid structures, vegetation, and meteorological conditions. Operational sound levels from the proposed Project equipment were estimated using the Datakustik CadnaA noise prediction software (the "model"), which utilizes the ISO 9613-2 standard[4] algorithms for outdoor sound propagation. CadnaA is a widely used modeling tool to estimate outdoor sound propagation.

The model was developed by importing the proposed Project layout, topographic data from the U.S. Geological Survey National Elevation Dataset, and aerial imagery. The solar inverter stations, BESS equipment, and substation transformer noise sources were modeled as point sources within the model based on the current Project layout provided by Summer Shade Solar. The solar and BESS inverter stations

[2] National Electrical Manufacturers Association (NEMA) Standards Publication TR 1-2013 (R2019). Transformers, Step Voltage Regulators and Reactors.
[3] Edison Electric Institute. Electric Power Plant Environmental Noise Guide. Volume 1 2nd Edition.
[4] ISO 9613-2: 1996. Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation.

were modeled at a height of 2.9 m (9.5 ft) above grade. The substation transformer was modeled at 3.0 m (9.8 ft) above grade. BESS containers were modeled at a height of 3.4 m (11.3 ft) above grade. Receptor points were added for the identified sensitive receptor locations within 2,000 feet of the Project Area at a height of 1.5 m (5 ft) above grade. A ground attenuation factor of 0.5 was used to represent the agricultural land of the Project parcels and surrounding area.

Additional assumptions that were used to conservatively estimate operational sound levels included the following:

- No sound attenuation from vegetation (foliage) to simulate a worst-case condition when leaves are not present on trees.
- Sound attenuation from existing buildings is not accounted for in the model. Land uses with intervening buildings between the receptor location and the Project noise sources will receive additional sound attenuation from buildings.
- Meteorological conditions conducive to sound propagation with all receptors located downwind of all noise sources.

The model produces estimated sound levels at the specified receptor locations as well as sound level contours as outputs. These outputs of the model are used to compare model results to the Project noise goal, as discussed in the next section.

This analysis was carried out in octave frequency bands, and results are displayed as the A-weighted sound level. Octave frequency band results for receptors are available upon request. The octave band results are consistent with the A-weighted sound level findings presented in this report.

The estimated daytime sound levels include all equipment operating simultaneously at full load. During the night, solar array inverters will be energized but operating in stand-by mode, generating minimal noise. Although the solar arrays will only generate power during daylight hours, the Project substation and BESS facility have been assumed to operate during daytime and nighttime hours. Although it is anticipated that Project substation power transformer operation during nighttime hours will be in the quieter standby mode, the estimated nighttime sound level analysis assumes operation at full load to conservatively estimate sound levels.

7.2 OPERATIONAL SOUND ASSESSMENT RESULTS

Operational sound levels estimated using the model for the 101 noise-sensitive receptors identified in the vicinity of the Project area are provided in tabular format in **Appendix A**. The estimated sound levels represent daytime and nighttime sound levels from the Project noise sources. **Appendix A** also shows the nearest distance from each receptor to the fence line, solar arrays, solar inverters, the substation, and BESS equipment.

Sound level contours for daytime operation with all Project noise sources operating at full load are displayed on **Figure 4**. The figure displays the overall project-generated sound levels from solar equipment, the substation, and the BESS equipment in the vicinity of the Project area and illustrates how sound is expected to propagate in the area. **Figure 5** shows the nighttime operational sound level contours produced by the substation transformer and BESS equipment. **Table 7.2** provides a summary of the expected sound levels at receptors within 2,000 feet of the Project boundaries.

Table 7.2: Summary of Estimated Operational Sound Levels at Sensitive Receptors

Estimated Sound Level	Number of Receptors	
	Daytime	Nighttime
25 dBA or less	37	76
26 dBA to 30 dBA	29	8
31 dBA to 35 dBA	23	10
36 dBA to 40 dBA	6	1
41 dBA to 45 dBA	6	6
46 dBA to 50 dBA	0	0
Greater than 50 dBA	0	0

The results of the operational sound modeling demonstrate that the highest expected daytime sound level at nearby sensitive receptors is 43 dBA at receptor R-66; this receptor is closest to the Project substation. This meets the daytime Project noise goal of 55 dBA by 12 dB. During the nighttime period, a maximum sound level of 43 dBA is also received at R-66. This meets the nighttime Project noise goal of 50 dBA by 7 dB. All other identified receptors receive sound levels lower than those received at R-66. Most nearby receptors receive sound levels less than 35 dBA, which is comparable to a typical quiet suburban environment at night. Overall, Project operational noise is expected to meet the Project noise goal.

8.0 Summary

An operational sound analysis was completed for the Summer Shade Solar Project to evaluate the impact of Project-generated sound on nearby noise-sensitive receptors. Quantitative noise regulations applicable to the Project were not identified. Therefore, an operational Project noise goal of 55 dBA during the day and 50 dBA at night was recommended. An operational noise model was developed and utilized to estimate the sound levels generated by Project equipment, including noise from the proposed solar array inverter stations, a substation transformer, and BESS equipment.

The solar generation portion of the Project will only produce electricity between sunrise and sunset. After sunset, the site no longer receives solar radiation, and the inverters will shift into stand-by mode and generate minimal noise. Although the solar arrays will only generate power during daylight hours, the Project substation power transformer and BESS equipment will operate periodically during daytime and nighttime hours.

The maximum Project-generated sound level was estimated to be 43 dBA during the daytime and nighttime periods at the closest residence. The noise assessment results demonstrate that Project operational sound levels are not expected to exceed the recommended Project noise goal of 55 dBA during the day and 50 dBA during the night.

The operational sound assessment conservatively assumed that inverters would be in operation at all primary and secondary solar arrays and that the substation transformer and BESS equipment will be operating continuously. There will likely be less equipment operating than what was assumed in this assessment; thus, overall sound levels are also expected to be lower than estimated herein.

A construction sound analysis was also completed considering impact pile driving and other typical construction equipment. Worst-case construction sound levels at the nearest residence are expected to range from 67 to 90 dBA with multiple pieces of equipment operating simultaneously. At times, construction activities will be audible at nearby residences or other noise-sensitive receptors. However, not all equipment will be operating at the same time, and activities will be temporary in duration and located throughout the Project area.

The equipment types, quantities, and locations used for this sound assessment are based on a preliminary Project layout and equipment selection details provided. If the equipment sound levels or quantities change in further designs, or equipment locations move closer to noise-sensitive areas, it is recommended that the sound assessment be updated.

FIGURES

March 18, 2025

Figure 1

Common Sound Levels

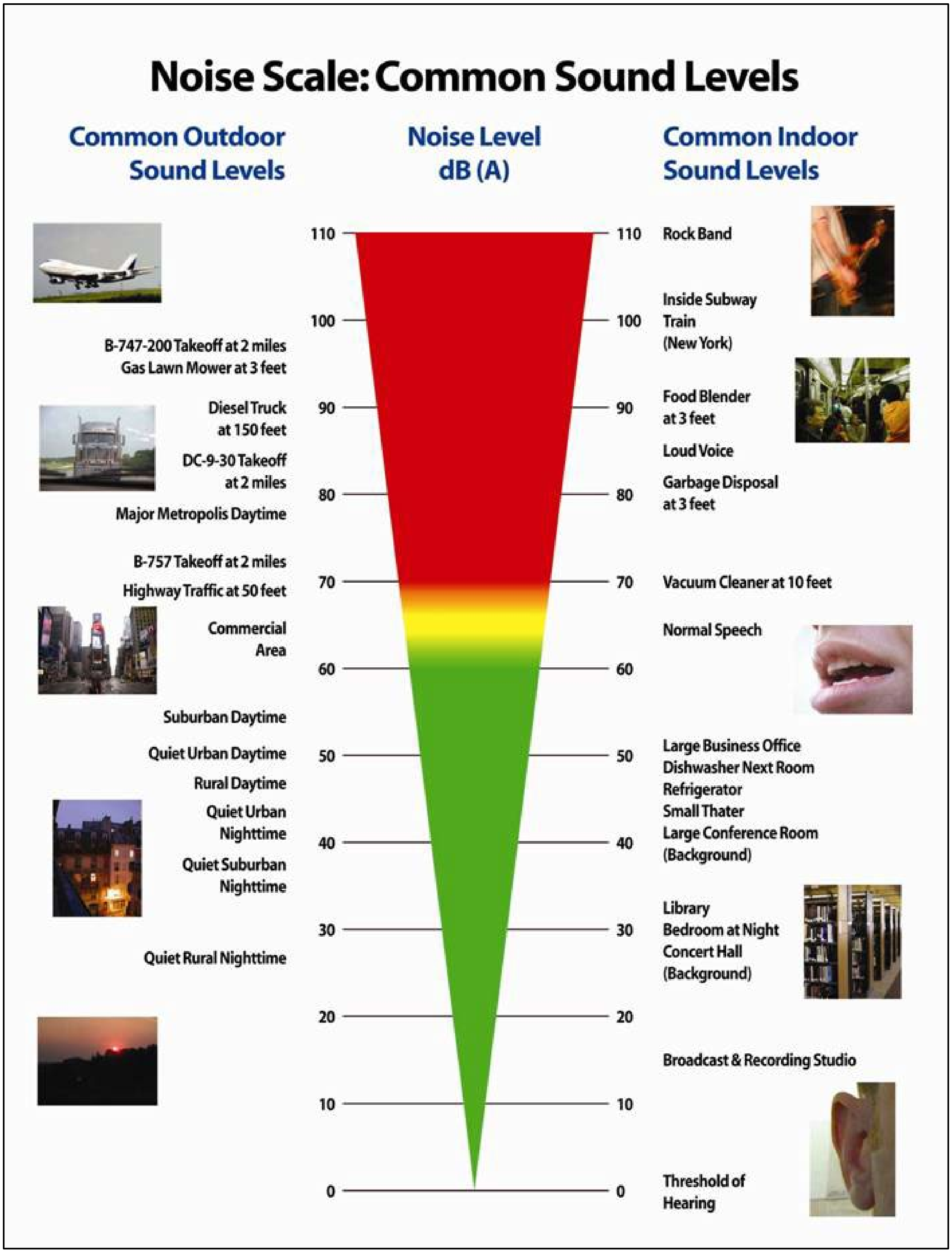
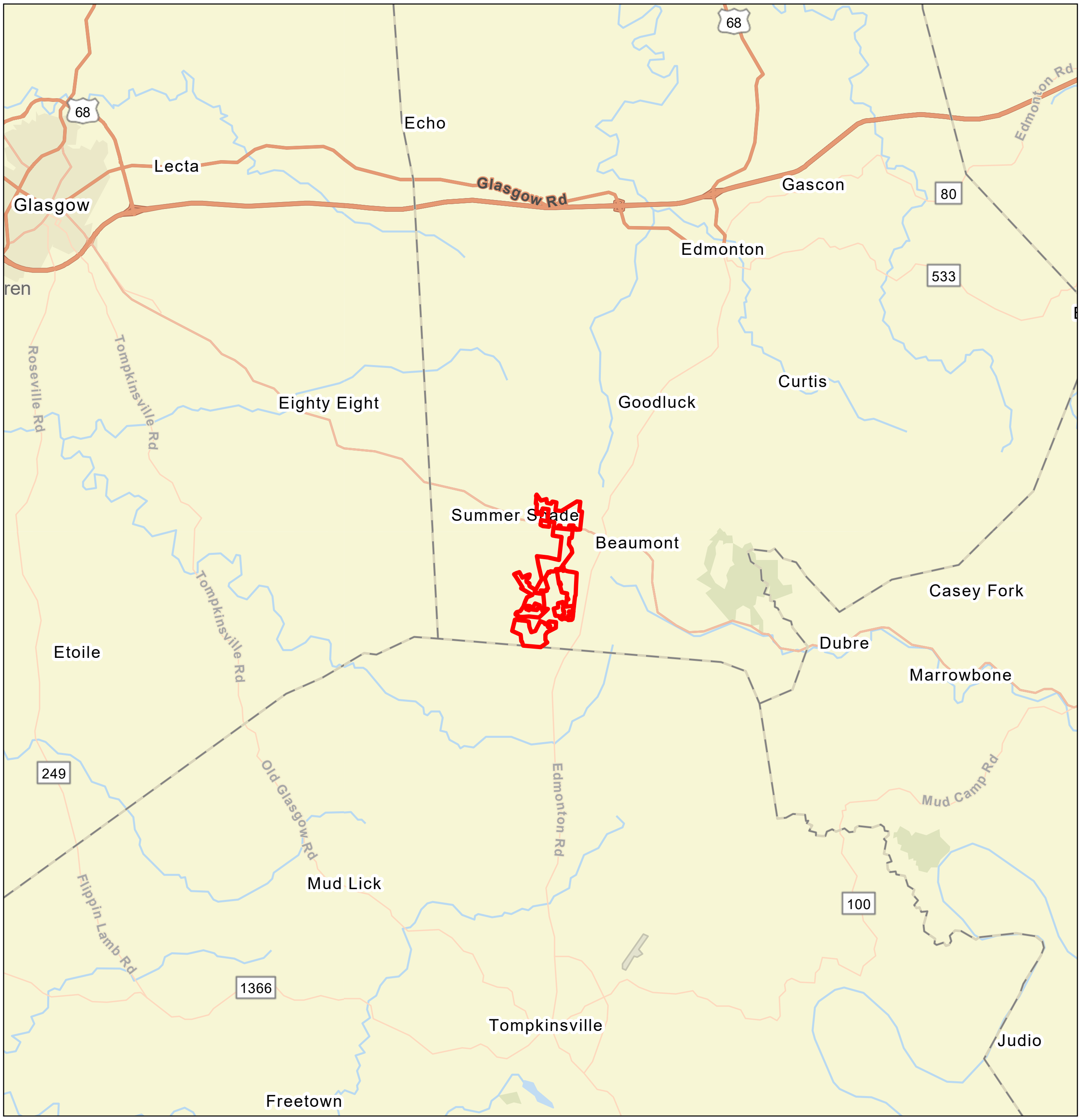
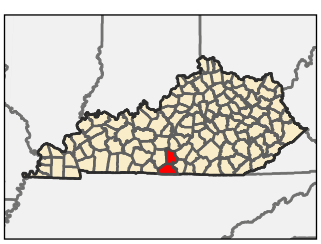


Figure 2

Project Vicinity Map





Legend

Project Study Area

0 10,000 20,000 Feet

(At original document size of 8.5x11)
1 inch = 20,000 feet

N

Stantec

Project Location
Metcalfe and Monroe Counties, Kentucky

Prepared by MNA on 2025-02-24
TR by SPK on 2025-02-24
IR by MC on 2025-02-25

Client/Project
172658275

Summer Shade Solar, LLC
Summer Shade Solar Project
Pre-Construction Acoustic Assessment

Figure No.
2

Title
Project Vicinity Map

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Stantec, Summer Shade Solar LLC
3. Background: Esri World Street Basemap

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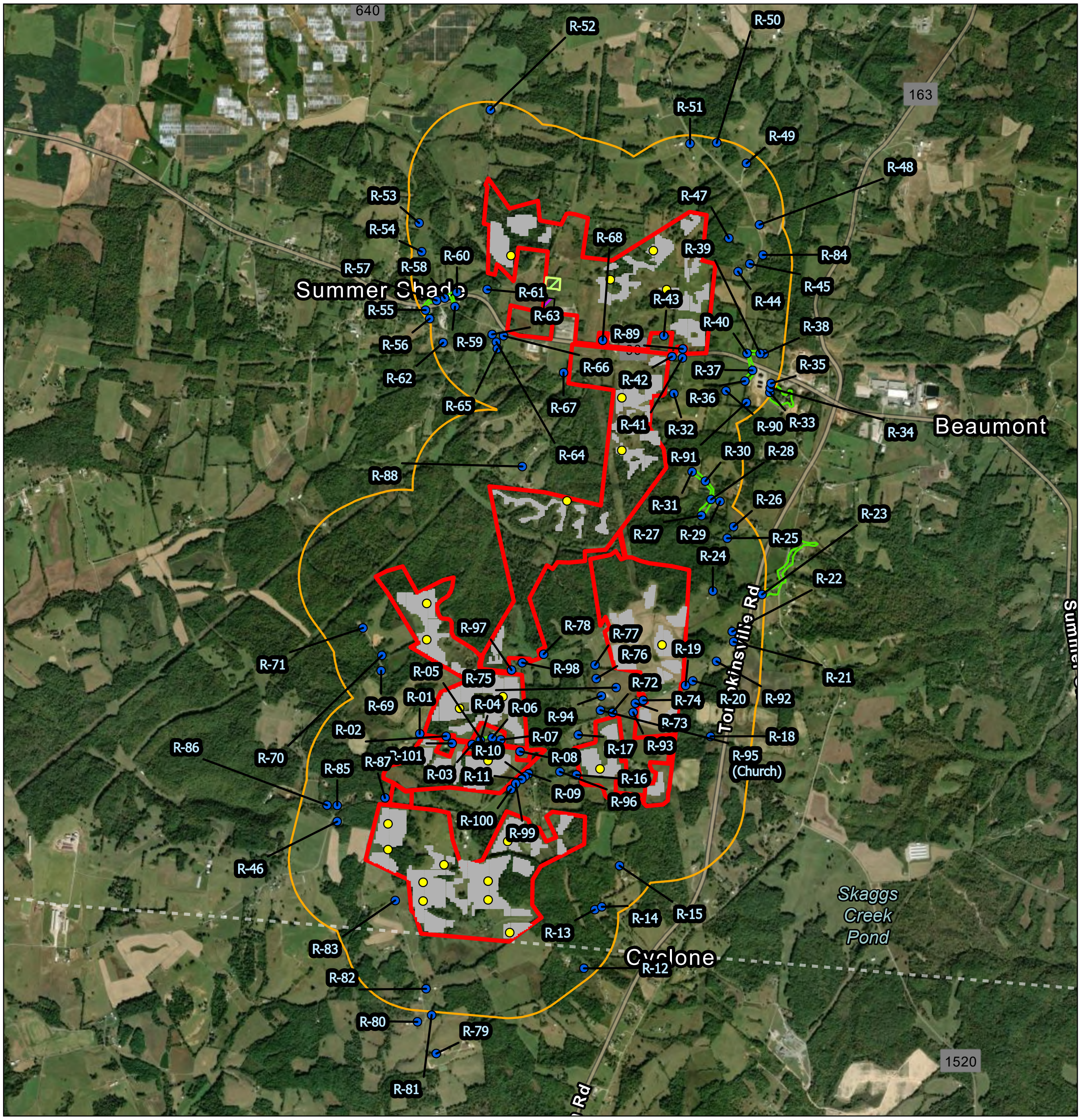
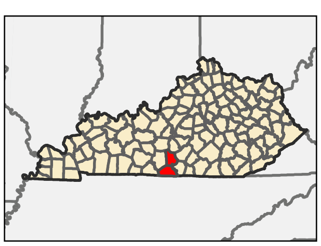
Figure 3

Project Layout and Noise-Sensitive Receptor Locations





Legend

- Project Study Area
- 2000ft Buffer
- Residential Neighborhoods as per KRS 278.700
- Panel Layout
- Proposed Project Substation
- Proposed Battery Energy Storage Site
- Noise Sensitive Receptors
- Noise Source Locations

0 2,000 4,000 Feet

(At original document size of 8.5x11)
1 inch = 4,000 feet

N

Stantec

Project Location
Metcalfe and Monroe Counties, Kentucky

Prepared by MNA on 2025-02-24
TR by SPK on 2025-02-24
IR by MC on 2025-02-25

Client/Project
172658275

Summer Shade Solar, LLC
Summer Shade Solar Project
Pre-Construction Acoustic Assessment

Figure No.
3

Title
Project Layout and Noise-Sensitive Receptor Locations

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Stantec, Summer Shade Solar LLC
3. Background: Esri World Imagery Hybrid Basemap

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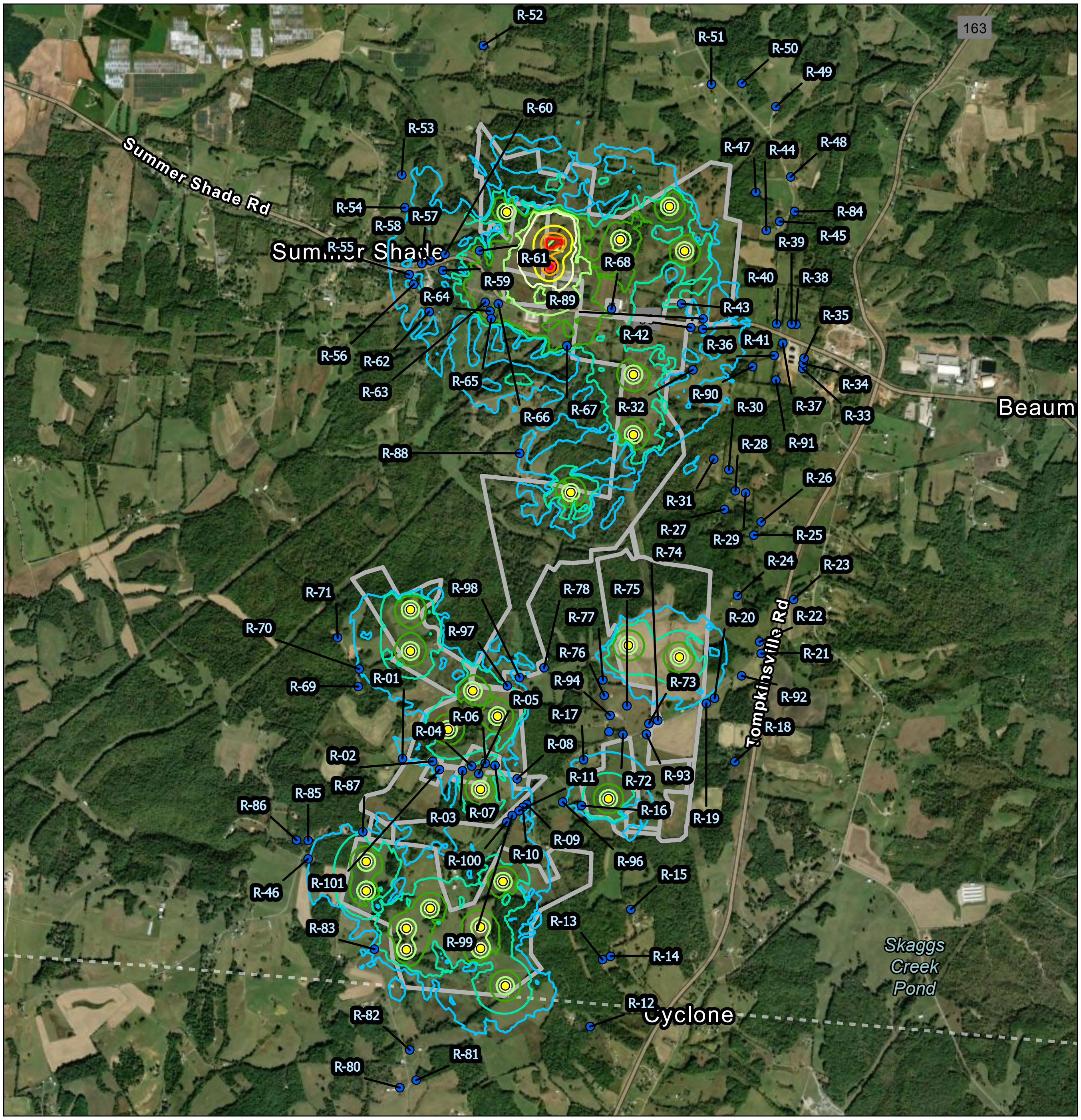
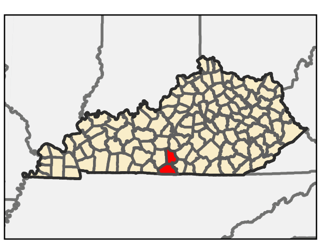
Figure 4

Estimated Operational Daytime Sound Level Contours





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Legend
- Project Study Area
- Proposed Project Substation
- Proposed Battery Energy Storage Site
- Noise Sensitive Receptors
- Noise Source Locations

Sound Level Contour (dBA)
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

0 1,750 3,500 Feet

(At original document size of 8.5x11)
1 inch = 3,500 feet

N

Stantec

Project Location
Metcalfe and Monroe Counties, Kentucky

Prepared by MNA on 2025-02-24
TR by SPK on 2025-02-24
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Summer Shade Solar, LLC
Summer Shade Solar Project
Pre-Construction Acoustic Assessment

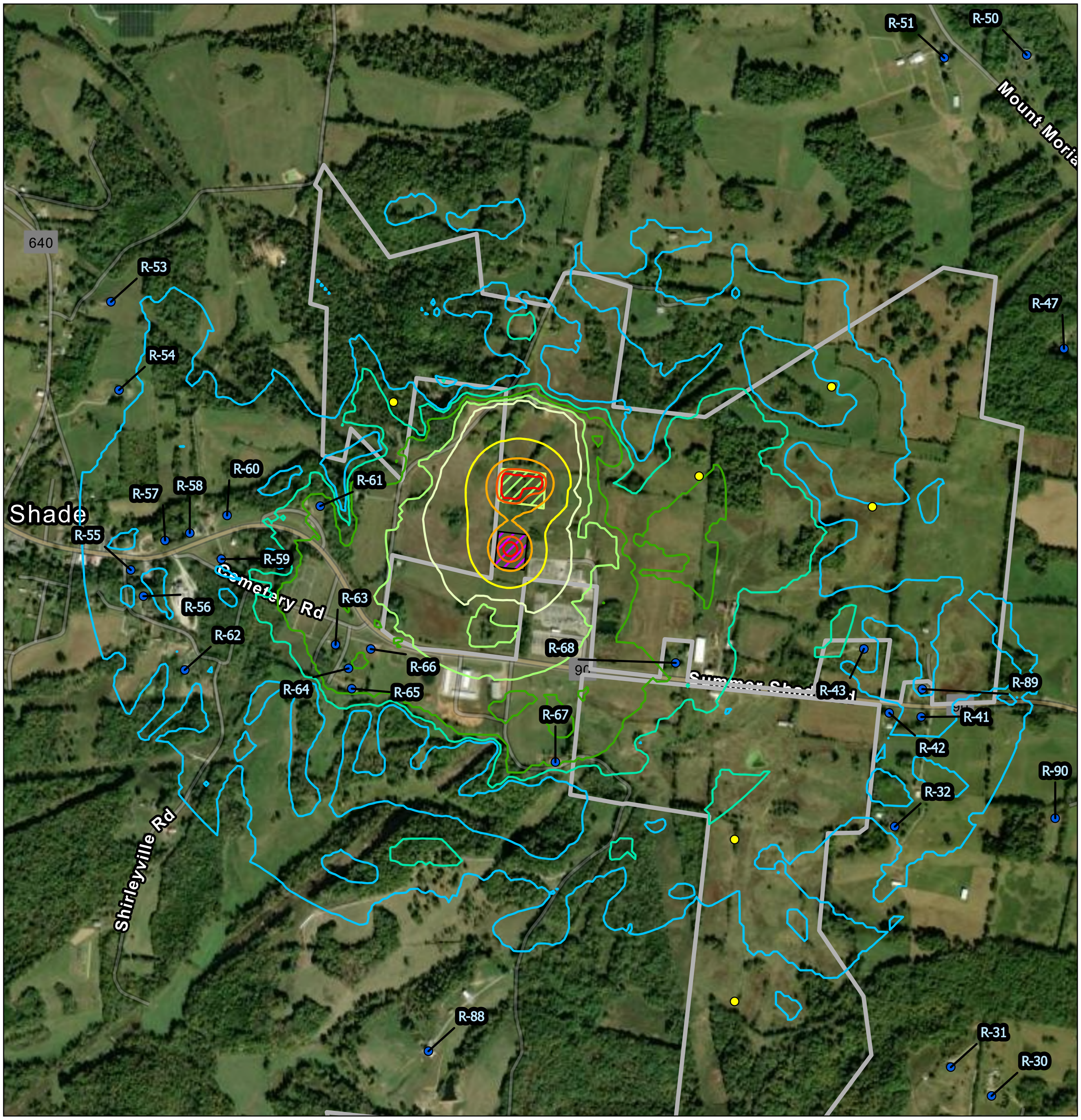
Figure No.
4

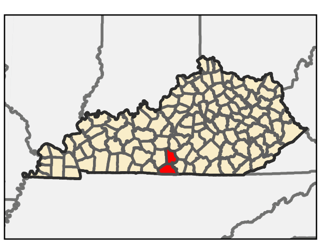
Title
Estimated Operational Daytime Sound Level Contours

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Stantec, Summer Shade Solar LLC
3. Background: Esri World Imagery Hybrid Basemap

Figure 5

Estimated Operational Nighttime Sound Level Contours





Legend
- Project Study Area
- Proposed Project Substation
- Proposed Battery Energy Storage Site
- Noise Sensitive Receptors
- Noise Source Locations

Sound Level Contour (dBA)
- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70

0 650 1,300 Feet
(At original document size of 8.5x11)
1 inch = 1,300 feet

N

Notes
1. Coordinate System: NAD 1983 StatePlane Kentucky FIPS 1600 Feet
2. Data Sources: Stantec, Summer Shade Solar LLC
3. Background: Esri World Imagery Hybrid Basemap

Stantec

Project Location
Metcalfe and Monroe Counties, Kentucky

Prepared by MNA on 2025-02-24
TR by SPK on 2025-02-24
IR by MC on 2025-02-25

Client/Project
172658275
Summer Shade Solar, LLC
Summer Shade Solar Project
Pre-Construction Acoustic Assessment

Figure No.
5

Title
Estimated Operational Nighttime Sound Level Contours

Appendix A

Receptor Locations (UTM 16 Coordinates) and Operational Sound Model Results

Receptor ID	Estimated Project Operational Sound Level		Distance to fence	Distance to Nearest Solar Panel	Distance to Near Solar Inverter	Distance to Substation	Distance to BESS equipment	Coordinates (UTM 16N)			Height above ground
	Daytime	Nighttime						X	Y	Z (ground)	
	dBA L_{eq}	dBA L_{eq}	m	m	m	m	m	m	m	m	m
R-01	30	15	45	59	375	3,516	3,668	615,756	4,079,373	302	1.5
R-02	34	15	28	56	246	3,482	3,630	615,966	4,079,356	312	1.5
R-03	37	15	90	100	180	3,506	3,650	616,174	4,079,293	322	1.5
R-04	37	15	89	101	173	3,463	3,606	616,238	4,079,327	322	1.5
R-05	40	15	79	98	109	3,510	3,651	616,287	4,079,274	315	1.5
R-06	37	15	92	110	184	3,432	3,573	616,331	4,079,348	324	1.5
R-07	35	15	86	100	195	3,439	3,578	616,400	4,079,334	320	1.5
R-08	29	15	45	70	265	3,517	3,655	616,554	4,079,243	307	1.5
R-09	31	14	133	159	339	3,689	3,827	616,625	4,079,067	309	1.5
R-10	31	14	115	145	320	3,711	3,849	616,597	4,079,046	308	1.5
R-11	31	14	110	140	307	3,737	3,875	616,571	4,079,021	307	1.5
R-12	15	0	522	539	654	5,235	5,368	617,084	4,077,527	307	1.5
R-13	21	10	487	501	700	4,775	4,907	617,165	4,077,994	306	1.5
R-14	17	11	542	521	760	4,757	4,888	617,220	4,078,017	301	1.5
R-15	19	11	532	439	785	4,446	4,574	617,357	4,078,345	316	1.5
R-16	35	14	64	87	194	3,697	3,830	617,004	4,079,063	325	1.5
R-17	31	15	118	129	321	3,380	3,513	617,015	4,079,381	318	1.5
R-18	20	15	278	294	824	3,611	3,721	618,066	4,079,381	321	1.5
R-19	25	16	47	109	373	3,162	3,274	617,863	4,079,784	333	1.5
R-20	26	16	84	119	376	3,147	3,257	617,919	4,079,821	336	1.5
R-21	25	17	386	407	569	2,999	3,095	618,239	4,080,137	336	1.5
R-22	25	17	366	382	568	2,923	3,018	618,228	4,080,217	336	1.5
R-23	22	18	588	607	890	2,803	2,884	618,461	4,080,515	346	1.5
R-24	25	20	219	243	589	2,567	2,662	618,070	4,080,537	328	1.5
R-25	23	21	607	633	994	2,279	2,358	618,178	4,080,959	325	1.5
R-26	23	21	711	738	1075	2,238	2,313	618,227	4,081,051	330	1.5
R-27	23	21	553	562	818	2,013	2,096	617,971	4,081,135	312	1.5
R-28	23	21	503	527	809	1,957	2,032	618,046	4,081,265	320	1.5
R-29	23	21	567	594	879	2,015	2,087	618,117	4,081,251	318	1.5
R-30	23	21	380	414	707	1,817	1,889	617,998	4,081,410	325	1.5
R-31	29	27	251	288	583	1,692	1,766	617,892	4,081,483	340	1.5
R-32	33	32	86	100	415	1,164	1,207	617,739	4,082,102	330	1.5
R-33	24	24	624	638	1158	1,840	1,846	618,502	4,082,122	332	1.5
R-34	25	24	607	621	1135	1,830	1,834	618,504	4,082,157	331	1.5
R-35	24	24	593	608	1115	1,825	1,825	618,510	4,082,193	330	1.5
R-36	24	23	413	427	957	1,623	1,628	618,303	4,082,209	329	1.5
R-37	26	25	414	429	937	1,653	1,649	618,361	4,082,295	327	1.5
R-38	25	24	464	477	927	1,709	1,693	618,452	4,082,428	333	1.5
R-39	28	28	433	446	900	1,679	1,663	618,421	4,082,429	334	1.5
R-40	29	28	329	343	815	1,576	1,562	618,316	4,082,430	328	1.5
R-41	30	30	94	125	557	1,093	1,102	617,804	4,082,387	310	1.5
R-42	31	30	42	55	516	1,012	1,025	617,721	4,082,396	308	1.5
R-43	36	34	51	75	368	901	893	617,653	4,082,560	318	1.5
R-44	27	25	197	252	586	1,473	1,417	618,237	4,083,078	332	1.5
R-45	25	25	293	362	692	1,575	1,515	618,329	4,083,141	329	1.5
R-46	30	12	301	321	404	4,390	4,548	615,109	4,078,667	317	1.5
R-47	18	17	198	243	608	1,465	1,384	618,160	4,083,342	322	1.5
R-48	23	23	460	474	868	1,730	1,646	618,402	4,083,453	322	1.5
R-49	24	24	541	563	1015	1,866	1,750	618,292	4,083,940	337	1.5
R-50	21	21	584	598	994	1,787	1,657	618,054	4,084,100	312	1.5
R-51	24	24	548	563	898	1,635	1,498	617,841	4,084,090	316	1.5
R-52	25	24	849	860	1170	1,554	1,411	616,252	4,084,338	276	1.5
R-53	28	28	559	571	774	1,163	1,104	615,697	4,083,431	294	1.5
R-54	29	29	531	544	709	1,046	1,012	615,721	4,083,204	291	1.5
R-55	31	31	667	681	805	939	972	615,758	4,082,739	273	1.5
R-56	32	32	681	699	817	910	956	615,791	4,082,672	282	1.5
R-57	32	32	551	565	690	853	872	615,845	4,082,817	281	1.5
R-58	33	33	487	502	625	792	806	615,909	4,082,837	282	1.5
R-59	34	34	470	488	602	706	737	615,991	4,082,770	287	1.5
R-60	34	34	382	400	520	701	705	616,005	4,082,883	286	1.5
R-61	41	41	215	231	329	465	464	616,245	4,082,911	302	1.5

Receptor ID	Estimated Project Operational Sound Level		Distance to fence	Distance to Nearest Solar Panel	Distance to Near Solar Inverter	Distance to Substation	Distance to BESS equipment	Coordinates (UTM 16N)			Height above ground
	Daytime	Nighttime						X	Y	Z (ground)	
	dBA L_{eq}	dBA L_{eq}	m	m	m	m	m	m	m	m	m
R-62	32	32	754	774	877	843	929	615,901	4,082,483	287	1.5
R-63	42	42	535	549	644	457	570	616,289	4,082,553	307	1.5
R-64	42	42	589	604	697	459	589	616,323	4,082,493	306	1.5
R-65	41	41	640	655	748	485	624	616,333	4,082,440	308	1.5
R-66	43	43	534	549	640	384	514	616,380	4,082,543	308	1.5
R-67	41	41	420	440	504	503	632	616,861	4,082,258	320	1.5
R-68	38	37	244	287	481	459	507	617,168	4,082,518	306	1.5
R-69	29	21	319	336	438	3,151	3,310	615,442	4,079,870	320	1.5
R-70	30	21	271	285	378	3,038	3,197	615,447	4,079,992	316	1.5
R-71	28	17	329	345	515	2,913	3,074	615,294	4,080,207	318	1.5
R-72	27	16	82	93	459	3,232	3,359	617,286	4,079,562	311	1.5
R-73	27	16	50	68	510	3,191	3,313	617,465	4,079,638	316	1.5
R-74	28	16	46	69	466	3,182	3,303	617,527	4,079,662	318	1.5
R-75	27	17	132	147	420	3,040	3,166	617,311	4,079,760	323	1.5
R-76	26	17	164	184	387	2,947	3,076	617,152	4,079,830	319	1.5
R-77	28	18	145	158	299	2,839	2,968	617,141	4,079,938	325	1.5
R-78	29	23	252	282	467	2,735	2,872	616,731	4,080,018	332	1.5
R-79	17	0	953	967	1124	5,977	6,119	615,920	4,076,834	286	1.5
R-80	19	0	705	720	961	5,752	5,896	615,767	4,077,084	288	1.5
R-81	20	0	649	662	902	5,681	5,824	615,880	4,077,138	292	1.5
R-82	25	0	441	453	698	5,481	5,626	615,832	4,077,347	296	1.5
R-83	34	8	127	144	221	4,846	4,995	615,578	4,078,046	312	1.5
R-84	24	24	411	486	813	1,690	1,626	618,432	4,083,212	324	1.5
R-85	29	12	336	352	429	4,272	4,430	615,108	4,078,795	318	1.5
R-86	24	12	415	431	506	4,302	4,461	615,027	4,078,796	315	1.5
R-87	34	13	65	84	208	4,084	4,238	615,487	4,078,860	313	1.5
R-88	30	28	240	253	448	1,263	1,406	616,543	4,081,507	286	1.5
R-89	33	32	52	69	488	1,073	1,073	617,806	4,082,458	313	1.5
R-90	25	25	386	398	830	1,514	1,532	618,153	4,082,129	333	1.5
R-91	25	24	549	562	991	1,701	1,719	618,317	4,082,039	334	1.5
R-92	25	17	260	274	452	3,077	3,179	618,106	4,079,979	339	1.5
R-93	27	16	45	57	521	3,258	3,382	617,449	4,079,565	316	1.5
R-94	26	17	229	240	503	3,090	3,218	617,195	4,079,692	314	1.5
R-95	28	16	122	135	466	3,201	3,330	617,189	4,079,578	312	1.5
R-96	28	14	160	184	319	3,669	3,803	616,873	4,079,085	325	1.5
R-97	35	22	33	61	222	2,879	3,018	616,478	4,079,888	330	1.5
R-98	28	18	101	126	310	2,813	2,951	616,562	4,079,948	326	1.5
R-99	32	14	108	126	286	3,774	3,912	616,524	4,078,987	308	1.5
R-100	32	14	125	136	292	3,822	3,961	616,487	4,078,941	307	1.5
R-101	33	15	60	80	285	3,527	3,674	616,014	4,079,300	314	1.5