Gustin Solar

Harrisville Township

Exhibit F

Preconstruction Sound Study

June 15, 2026

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CONSUMERS ENERGY

SOUND STUDY

GUSTIN SOLAR ENERGY CENTER (HARRISVILLE)

PROJECT NO. 192088

JUNE 15, 2026

CONTENTS

EXECUTIVE SUMMARY I

1.0 Acoustic Terminology 1-1

2.0 Applicable Regulations 2-1
- 2.1 State of Michigan 2-1
- 2.2 Alcona County 2-1
- 2.3 Harrisville Township 2-1
- 2.4 Applicable Regulations 2-1

3.0 Predictive Modeling 3-1
- 3.1 Sound Modeling Methodology and Input Parameters 3-1
- 3.2 Project Equipment 3-1
- 3.3 Modeling Results 3-2

4.0 Conclusions 4-1

APPENDIX A – GENERAL ARRANGEMENT DRAWING

APPENDIX B – VENDOR-PROVIDED EQUIPMENT SPECIFICATIONS

FIGURES

Figure 3-1: Sound Level Contours 3-3

TABLES

Table 1-1: Typical Sound Pressure Levels Associated with Common Sound Sources 1-2

Table 3-1: Sound Modeling Parameters 3-1

Table 3-2: Project Equipment Model Input 3-2

List of Abbreviations

Abbreviation	Term/Phrase/Name
ANSI	American National Standards Institute
Burns & McDonnell	Burns & McDonnell Michigan, Inc.
CadnaA	Computer Aided Noise Abatement
Consumers	Consumers Energy
dB	decibels
dBA	A-weighted decibels
Hz	Hertz
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
L_{eq}	equivalent sound level
L_X	X-percentile exceedance sound level
MCL	Michigan Compiled Laws
PL	property-line receivers
Project	Gustin Solar Energy Center (Harrisville)
PV	photo-voltaic
PWL	sound power level
SPL	sound pressure level

Executive Summary

The Gustin Solar Energy Center (Project) is a 94-megawatt alternating current solar energy facility proposed in Harrisville Township, Alcona County, Michigan. The Project consists of multiple solar array blocks containing photo-voltaic (PV) modules attached to a single-axis tracking system mount on steel piles, inverters, access roads, and electrical collection lines. The Project will interconnect to a new substation in Gustin Township.

Burns & McDonnell Michigan, Inc. (Burns & McDonnell) conducted a sound study for the Project. The Harrisville Township Zoning Ordinance imposes a noise limit of 45 dBA at adjacent non-participating parcels.

The sound study is based on the Project layout included in Appendix A. Burns & McDonnell used a predictive model to estimate the Project sound levels based on major sound-emitting equipment operating at maximum sound levels at the same time. The Project, as modeled, is predicted to comply with the applicable sound level limits.

1.0 Acoustic Terminology

The term “sound level” is often used to describe two different sound characteristics: sound power and sound pressure. Every source that produces sound has a sound power level (PWL). The PWL is the acoustic energy emitted by a sound source and is an absolute number that is not affected by the surrounding environment. The acoustic energy produced by a source propagates through media as pressure fluctuations. These pressure fluctuations, also called sound pressure levels (SPL), are what human ears hear and microphones measure.

Sound is physically characterized by amplitude and frequency. The amplitude of sound is measured in decibels (dB) as the logarithmic ratio of a sound pressure to a reference sound pressure (20 micropascals). The reference sound pressure corresponds to the typical threshold of human hearing. To the average listener, a 3-dB change in a continuous broadband sound is generally considered “just barely perceptible”; a 5-dB change is generally considered “clearly noticeable”; and a 10-dB change is generally considered a doubling (or halving, if the sound is decreasing) of the apparent loudness.

Sound waves can occur at many different wavelengths, also known as the frequency. Frequency is measured in hertz (Hz) and is the number of wave cycles per second that occur. The typical human ear can hear frequencies ranging from approximately 20 to 20,000 Hz. Normally, the human ear is most sensitive to sounds in the middle frequencies (1,000 to 8,000 Hz) and is less sensitive to sounds in the lower and higher frequencies. As such, the A-weighting scale was developed to simulate the frequency response of the human ear to sounds at typical environmental levels. The A-weighting scale emphasizes sounds in the middle frequencies and de-emphasizes sounds in the low and high frequencies. Any sound level to which the A-weighting scale has been applied is expressed in A-weighted decibels, or dBA. For reference, the A-weighted sound pressure level and subjective loudness associated with some common sound sources are listed in Table 1-1.

Sound in the environment is constantly fluctuating when a car drives by, a dog barks, or a plane passes overhead. Therefore, sound metrics have been developed to quantify fluctuating environmental sound levels. These metrics include the exceedance sound level. The exceedance sound level is the sound level exceeded during “x” percent of the sampling period and is also referred to as a statistical sound level. Common exceedance sound level values are the 10-, 50-,90-percentile exceedance sound levels, denoted by L_{10}, L_{50}, and L_{90}. The equivalent-continuous sound level (L_{eq}) is the logarithmic average of the varying sound over a given time period and is the most common metric used to describe sound.

Table 1-1: Typical Sound Pressure Levels Associated with Common Sound Sources

Sound Pressure Level (dBA)	Subjective Evaluation	Environment
140	Deafening	Jet aircraft at 75 feet
130	Threshold of pain	Jet aircraft during takeoff at a distance of 300 feet
120	Threshold of feeling	Elevated train
110	Very loud	Jet flyover at 1,000 feet
100		Motorcycle at 25 feet
90	Moderately loud	Propeller plane flyover at 1,000 feet
80		Diesel truck (40 mph) at 50 feet
70	Loud	B-757 cabin during flight
60	Moderate	Air-conditioner condenser at 15 feet
50	Quiet	Private Office
40		Farm field with light breeze, birdcalls
30	Very quiet	Quiet residential neighborhood
20		Rustling leaves
10	Just audible	--
0	Threshold of hearing	--

Sources:
(1) Adapted from Architectural Acoustics, M. David Egan, 1988
(2) Architectural Graphic Standards, Ramsey and Sleeper, 1994

2.0 Applicable Regulations

Burns & McDonnell reviewed the following regulatory sources to determine the criteria applicable to the Project. The applicable regulations are summarized in the sections below.

2.1 State of Michigan

The State of Michigan applies the following regulations for noise generated by a solar energy facility:

> (*iv*) The solar energy facility does not generate a maximum sound in excess of 55 average hourly decibels as modeled at the nearest outer wall of the nearest dwelling located on an adjacent nonparticipating property. Decibel modeling shall use the A-weighted scale as designed by the American National Standards Institute.
>
> (*vi*) The solar energy facility will comply with any more stringent requirements adopted by the commission. Before adopting such requirements, the commission must determine that the requirements are necessary for compliance with state or federal environmental regulations.

2.2 Alcona County

No applicable numeric sound level limits were identified in any county ordinances.

2.3 Harrisville Township

Sec. 7.31 C5 of The Harrisville Township Zoning Ordinance provides the following regulations applicable to noise generated by solar energy facilities:

> *"The sound pressure level of a solar energy facility and all ancillary solar equipment shall not exceed forty-five (45) dBA (L_{eq} (1 hour)) at the property line of an adjacent non-participating lot at 2am. The site plan shall include modeled sound isolines extending from the sound source to the property lines to demonstrate compliance with this standard."*

2.4 Applicable Regulations

The Project is governed by the Harrisville Township Zoning Ordinance identified above that limits noise to 45 dBA at adjacent non-participating parcels.

3.0 Predictive Modeling

3.1 Sound Modeling Methodology and Input Parameters

Sound modeling was performed using the industry-accepted sound modeling software Computer Aided Noise Abatement (CadnaA), version 2026. The software is a scaled, three-dimensional program which accounts for air absorption, terrain, ground absorption, reflections and shielding for each piece of sound-emitting equipment and predicts sound pressure levels. The model calculates sound propagation based on International Organization for Standardization (ISO) 9613-2:2024; General Method of Calculation. ISO 9613-2 assesses the sound level propagation based on the octave band center-frequency range from 31.5 to 8,000 Hz.

The ISO standard considers sound propagation properties and user input directivities for noise sources. The software also assumes moderate downwind sound propagation in all directions from all noise sources, as well as a moderate temperature inversion for propagation calculations. In other words, the model assumes that each piece of equipment always propagates its worst-case sound levels in all directions. Empirical studies accepted within the industry have demonstrated that modeling may over-predict sound levels in certain directions, and as a result, modeling results generally are considered a conservative measure of a project’s actual sound level.

The modeled temperature and relative humidity were left at the program’s default values. Reflections and shielding were considered for sound waves encountering physical structures. Terrain elevations were included in the model to account for surface effects. Ground absorption values can range from 0.0 (fully reflective surface) to 1.0 (fully absorptive surface). The ground absorption was conservatively set to 0.5 for the Project area. The sound modeling parameters used are summarized in Table 3-1.

Table 3-1: Sound Modeling Parameters

Model Input	Parameter Value
Ground Absorption	0.5
Number of Reflections	2
Receptor Height	5 feet above grade
Terrain	USGS topographic land data
Temperature	50 °F
Humidity	70%

3.2 Project Equipment

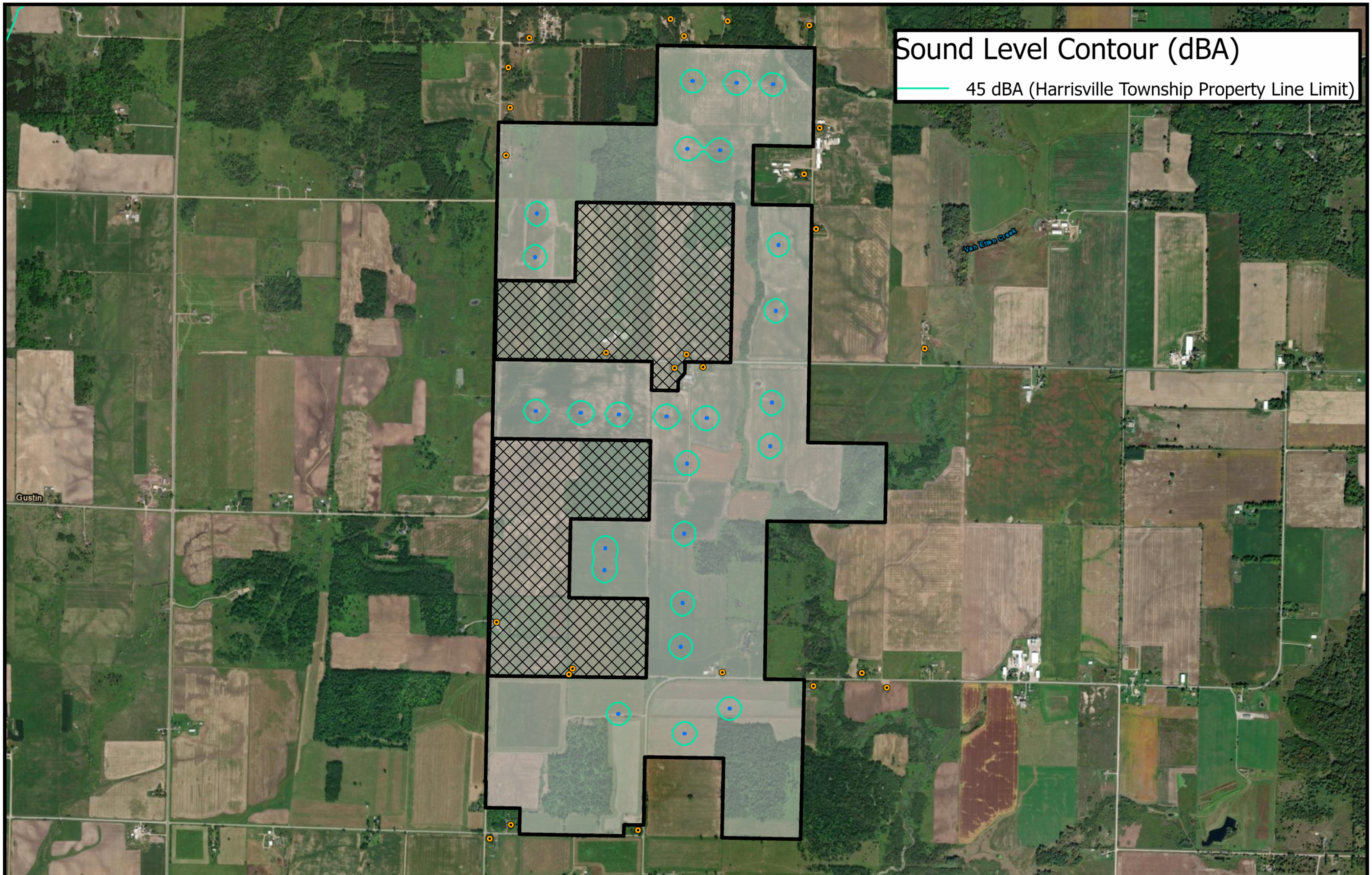
Project operational sound levels were modeled assuming each piece of equipment is operating at full load. Onsite inverters are expected to be the primary sound sources associated with the Project. Sound emissions from the PV modules and tracking system are expected to be negligible and were not included in the predictive model. The inverters selected for the Project are Siemens Gamesa Proteus PV 4500 Inverters. The Gamesa Electric Proteus PV Station was measured to be less than 60 dBA at 10 meters. The modeling sound pressure and sound power levels inputs are shown in Table 3-2. Project inverters and transformers were modeled based on general arrangement drawings as provided in Appendix A. Vendor-provided equipment specifications are provided in Appendix B.

Table 3-2: Project Equipment Model Input

Equipment Name	Number of Sources	Sound Power Level (dBA)	Sound Pressure Level (dBA)
Gamesa Electric Proteus PV Station	25	94 dBA	60 dBA at 10 meters

3.3 Modeling Results

Measurement points ("receivers") were identified at building in the vicinity of the Project to predict the maximum Project sound level impacts. A graphical representation of the Project sound levels, and the locations of the buildings identified through use of ariel imagery are provided in Figure 3-1. The modeling shows that the Project will comply with all applicable noise limits.



Building Structure
Project Noise Sources
Project Boundary
Non-participating Parcels

NORTH

2,000 1,000 0 2,000
Scale in Feet

BURNS McDONNELL

Figure 3-1
Consumers Energy
Harrisville Township
Non-Participating Parcel Limit
Sound Contour Map

Source: ESRI, Burns & McDonnell

Issued: 5/21/2026

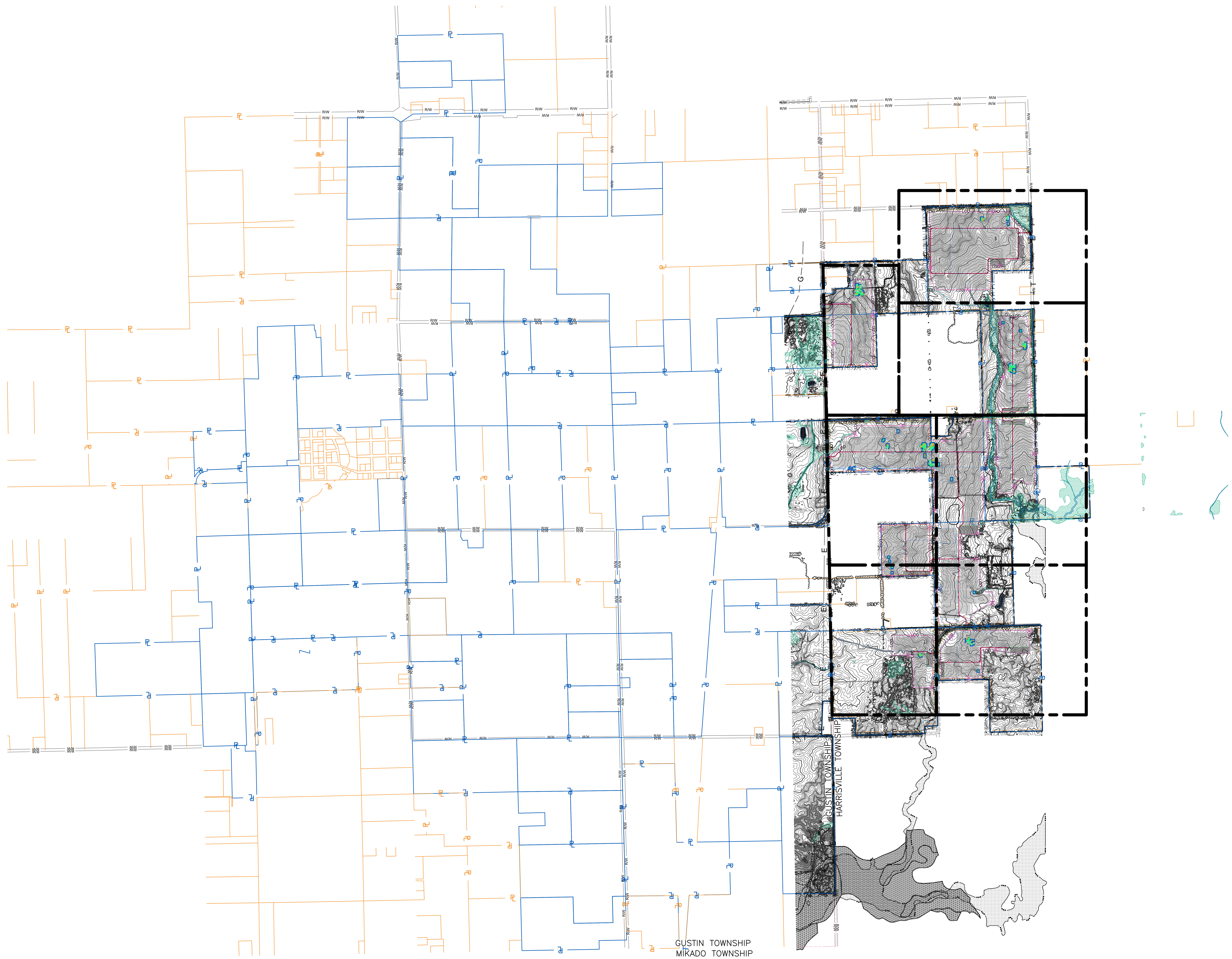
4.0 Conclusions

Burns & McDonnell conducted a sound study for the Project proposed in Harrisville Township, Alcona County, Michigan. The sound study consisted of a review of potential regulatory sources and predictive modeling to determine Project sound level impacts at regulatory measurement points.

Project equipment will be subject to the commercial solar energy facility-specific noise limit specified in Harrisville Township Zoning Ordinance. Burns & McDonnell used a predictive noise model to estimate the Project sound levels based on all major sound-emitting equipment operating at maximum normal operating sound levels at the same time. The Project, as modeled, is expected to comply with the noise limits outlined in this report.

APPENDIX A – GENERAL ARRANGEMENT DRAWING

SHEET SIZE: ANSI-D 22x34



NOTES:

1. DRAWING SCALE FOR ENLARGED SITE PLANS IS PRESENTED AT 1" = 200' FOR LEGIBILITY OF REVIEW.
2. ALL TEMPORARY STAGING AREAS ARE TO BE CONSTRUCTED AT-GRADE (UNLESS NOTED OTHERWISE) AND WILL MAINTAIN THE EXISTING TOPOGRAPHY OF THE SITE. FINAL CONTOURS ARE TO MATCH EXISTING CONTOURS.
3. PRE-DEVELOPMENT DRAINAGE PATTERNS ARE TO BE MAINTAINED TO THE GREATEST EXTENT PRACTICABLE.
4. SOLAR EQUIPMENT SETBACK INCLUDES REQUIRED DEFINING SETBACKS FROM THE HARRISVILLE TOWNSHIP SOLAR ORDINANCE.
   4.1. HARRISVILLE TWP ORDINANCE SECTION 7.31 C.2: THE COMMERCIAL SOLAR ENERGY SYSTEM ALL PHOTOVOLTAIC (PV) SYSTEMS AND SUPPORT STRUCTURES ASSOCIATED WITH SUCH FACILITIES (EXCLUDING PERIMETER FENCING) SHALL BE SETBACK A MINIMUM OF FORTY (40) FEET FROM THE SIDE OR REAR PROPERTY LINE AND A MINIMUM OF FIFTY (50) FEET FROM ANY ROAD RIGHT-OF-WAY. SETBACKS SHOULD BE MEASURED THE PANEL IS AT MINIMUM TILT.
5. NO DRAINAGE, SANITARY SEWER, STORM SEWERS, OR OTHER UTILITY MAINS ARE IDENTIFIED ON SITE.
6. THIS SITE WILL INCLUDE PROJECT SIGNAGE PROVIDING BASIC INFORMATION TO THE PUBLIC.
7. ALL INTERNAL TURNING RADII ALONG AGGREGATE ACCESS ROADS SHALL BE A MINIMUM OF 35-FT.
8. LOCATIONS OF UNDERGROUND COLLECTION LINES ARE APPROXIMATE IN NATURE AND SUBJECT TO CHANGE

LEGEND:

SITE IMPROVEMENTS & GRADING:

300 — EXISTING CONTOUR (MAJOR)
322 — EXISTING CONTOUR (MINOR)
PROJECT BOUNDARY – CONSUMERS ENERGY
SOLAR EQUIPMENT SETBACK – SEE NOTE 4
PROPERTY LINE – NON-PARTICIPATING
PROPERTY LINE – PARTICIPATING
WETLANDS – JURISDICTIONAL
WETLANDS – NON-JURISDICTIONAL
LIMITS OF EARTHWORK
300 — PROPOSED CONTOUR (MAJOR)
322 — PROPOSED CONTOUR (MINOR)
CULVERT
PROPOSED FENCE
AC — MEDIUM VOLTAGE CABLE (FOR REFERENCE ONLY)
PROPOSED SOLAR ARRAY (FOR REFERENCE ONLY)
TEMPORARY STAGING AREA
12-FT ACCESS ROAD
45 DBA SOUND CONTOUR
LOD — LIMITS OF DISTURBANCE
LOD — LIMITS OF DISTURBANCE FOR ELECTRICAL INSTALLATION (FOR REFERENCE ONLY)
VEGETATIVE BUFFER

1400' 700' 0 1400' 2800'

1" = 1400'

FOR PERMITTING PURPOSES ONLY

REFERENCE DRAWINGS	REV	DATE	DESCRIPTION	DR	BY	CHK	APP	CO

REV	DATE	DESCRIPTION	DR	BY	CK	APP	CO
A	06/11/26	ISSUED FOR PERMITTING	ADB	ACG	JTD	GLA	BMC

SIGNATURE

NAME: G. ALBANSODER

MICHIGAN P.E. No.: 6201313263

Consumers Energy

GUSTIN SOLAR ENERGY CENTER
ALCONA COUNTY, MI

SITE IMPROVEMENTS & GRADING
KEY PLAN

UNIT:N/A

SCALE: 1" = 1400'	DRAWING NO.	SHEET	REV.
JOB: 192088	1823-CV-240	001	A

C:\BMCD_LIB\DC\ACCDOCS\BMCD ENR\CE-GUSTINSOLAR\PROJECT FILES\2_DSGN\CIVIL\DWGS\PERMITTING\G1\1823-CV-240-001.DWG 5/13/2026 8:31 AM ACGEORGE

APPENDIX B – VENDOR-PROVIDED EQUIPMENT SPECIFICATIONS

Noise Level Declaration

Manufacturer: GAMESA ELECTRIC

Address: c/ Mar Mediterráneo 14-16, CP28830 San Fernando de Henares, Madrid

Declares that the product:

GAMESA ELECTRIC PROTEUS PV STATION

Gamesa Electric power stations assembled on metallic skid, emits maximum sound pressure levels (dB(A)) according to the following table:

10m distance		**< 60**		10m distance
	1m distance	**< 80**	1m distance	
< 60	**< 80**		**< 80**	**< 60**
	1m distance	**< 80**	1m distance	
10m distance		**< 60**		10m distance

Those values are with the power station running at full power and at 50°C ambient temperature.

Yours sincerely,

Date: December 2022

Jorge García Gómez
Gamesa Electric Industrial Program Manager

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