Franklintown Farm Solar Project

Pre-Construction Acoustical Assessment

PREPARED FOR
Franklintown Farm Solar, LLC

DATE
August 9, 2024

REFERENCE
0744173

CONTENTS

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

dBA	A-weighted decibels
EEI	Edison Electric Institute
ERM	Environmental Resources Management, Inc.
ISO	International Organization for Standardization
MVA	Mega-volt Ampere
MW	Megawatts

1. INTRODUCTION

1.1 Scope of Report

On behalf of Franklintown Farm Solar, LLC (Client), Environmental Resources Management, Inc. (ERM) completed a pre-construction noise assessment of the proposed Franklintown Farm Solar Project (Project). The Project will include an 80 MW solar energy facility with 20 MW battery energy storage system (BESS) and will consist of approximately 147,000 photovoltaic modules located on approximately 499 acres in Jefferson County, West Virginia. The primary noise generating sources associated with the Project include the solar inverters, solar transformers, and substation transformer. Figure 1 in Appendix A presents an overview of the Project, including the location of the Project sources in relation to other Project facilities and the surrounding properties.

ERM completed an acoustical modeling analysis to evaluate whether the contribution of operational noise from the Project would comply with the Jefferson County zoning ordinance pertaining to allowable noise levels from industrial and commercial uses. This report presents the results of ERM's acoustical analysis of the Project.

1.2 General Information on Noise

Noise is typically measured on the A-weighted scale (dBA). The A-weighting scale has been shown to provide a good correlation with the human response to sound and is the most widely used descriptor for community noise assessments (Harris, 1991). The faintest sound that can be heard by a healthy ear is about 0 dBA, while an uncomfortably loud sound is about 120 dBA. In order to provide a frame of reference, some common sound levels are listed below.

- Pile Driver at 100 feet 90 to 100 dBA
- Chainsaw at 30 feet 90 dBA
- Truck at 100 feet 85 dBA
- Noisy Urban Environment 75 dBA
- Lawn Mower at 100 feet 65 dBA
- Average Speech 60 dBA
- Average Office 50 dBA
- Rural Residential During the Day 40 dBA
- Quiet Suburban nighttime 35 dBA
- Soft Whisper at 15 feet 30 dBA

2. NOISE REGULATIONS

The Jefferson County Zoning and Land Development Ordinance includes regulations applicable to solar energy systems and requires that solar energy systems comply with the noise requirements provided in Section 8.9 – A.1 of the ordinance. The noise requirement states that industrial and

commercial uses in Jefferson County shall comply with specific noise limits when measured at the Project property line. The most restrictive limit applies to adjoining agricultural or residential growth district zones, with noise limits of 60 dBA during the day (7 am to 6 pm) and 50 dBA at night (6 pm to 7 am). For residential uses in Light Industrial zoned properties, less restrictive limits of 65 dBA during the day and 55 dBA at night apply. Construction noise is exempt from the ordinance provided that it occurs between the hours of 7:00 a.m. and 7:00p.m.

The area surrounding the Project site is zoned mainly rural, where the most restrictive 50 dBA at night limit applies. A residential/light industrial zone, where the nighttime limit is 55 dBA, is located on the southeastern side of the Project site. The zones are depicted in Figure 1 of Appendix A.

No State of West Virginia noise standards applicable to the Project were identified.

3. ACOUSTICAL MODELING

3.1 Methodology

ERM performed computer modeling to calculate noise levels that will be generated during Project operation and used the commercially available CadnaA model developed by DataKustik GmBH (2006) for the analysis. The software has the ability to account for spreading losses, ground and atmospheric effects, shielding from barriers and buildings, and reflections from surfaces. The software is standards-based. ERM used the International Organization for Standardization (ISO) 9613 standard for air absorption and other noise propagation calculations (ISO 1996). ERM took credit for a partially acoustically absorptive ground surface (0.5 setting in the model). A setting of "0" corresponds to an acoustically reflective surface, such as pavement or water, while a setting of 1.0 corresponds to loose soils and grassy surfaces. ERM included the existing topographic features in the area.

The noise model allowed for the quantification of noise levels from multiple sources, based on the sound characteristics (overall level, frequency data etc.) emitted from each source to calculate the expected noise levels from Project operations at the Project property line and surrounding areas.

Modeling was conducted to develop noise contour maps that demonstrate noise levels throughout the Project area. A summary of the equipment sources included in the noise modeling assessment, their locations, and their height above grade are provided in Table 1. Table 2 provides the noise emissions data and the derivation for each source.

Table 1. Equipment Source Listing

Source	Number of Each	Source Height Above Grade (feet)
Solar Inverters	72[a]	6
3.5 MVA Auxiliary Transformer	18	10
Substation 89 MVA Transformer	1	10

[a] There are 18 inverter blocks that each contain 4 inverters for a total of 72 inverters. Each inverter block contains one 3.5 MVA transformer.

Table 2. Noise Emissions Derivation for Project Sources

Equipment	Noise Emissions Data	Data Source
Solar Inverters	71 dBA at 50 feet	TMEIC [a]
3.5 MVA Auxiliary Transformer	47 dBA at 50 feet	EEI [b]
Substation 98 MVA Transformer	65 dBA at 50 feet	EEI [b]

[a.] TMEIC Solar Ware Ninja Model PVU-0840GR. Data are for one inverter block (4 inverters).
[b.] Emissions data developed utilizing the methodology found in Edison Electric Institute's "Electric Power Plan Environmental Noise Guide" based on maximum transformer MVA rating.

3.2 Noise Model Results

The noise modeling results are presented as noise contours in Figure 2 of Appendix A. Noise contours are presented herein rather than results at discrete receptor points in order to demonstrate the modeled Project noise levels at any location along the Project property line, which is where the Jefferson County noise ordinance limits of 50 dBA for adjacent residential zones and 55 dBA for residential for adjacent Light Industrial zones are applicable.

A review of Figure 2 reveals that modeled Project noise levels are demonstrated to be in compliance with the ordinance. The 50 dBA noise contour, which represents the most restrictive nighttime limit for residentially zoned areas, remains inside the Project boundary.

The noise levels presented herein are for daytime conditions when all Project sources are operating at full load conditions. Lower noise levels will occur during nighttime hours when the solar inverters are not operating.

4. CONCLUSION

This report presents the results of the acoustical assessment ERM conducted for the Franklintown Farm Solar Project in Jefferson County, West Virginia. The assessment included a detailed noise model of the major facility noise generating equipment operating under full load conditions and a comparison to the noise regulations within the Jefferson County Zoning and Land Development ordinance.

The operational noise assessment revealed that Project-generated noise levels would be in compliance with the applicable noise regulations for the Rural and Residential in Light Industrial zoned parcels around the Project site. Operational Project noise levels were shown to be less than 50 dBA at all locations on the Project property line, with 50 dBA being the most restrictive limit within the zoning ordinance. Notably, lower noise levels than those presented in this report will occur during nighttime hours when the solar inverters are not operating.

5. REFERENCES

DataKustik GmbH. 2006. Computer Aided Noise Abatement Model CadnaA. Munich, Germany.

Edison Electric Institute. 1994. Electric Power Plant Environmental Noise Guide. Prepared by Bolt, Beranek and Newman, Inc., Cambridge, Massachusetts.

Harris, 1991. Handbook of Acoustical Measurements and Noise Control, Third Edition (McGraw-Hill, Inc., 1991).

ISO, 1996. International Organization for Standardization. Standard ISO 9613-2 Acoustics – Attenuation of Sound During Propagation Outdoors, Part 2 General Method of Calculation. Geneva, Switzerland.

Jefferson County Planning Commission. 2022. Jefferson County Zoning and Land Development Ordinance, Section 8.9 – A.1, Amended June 16, 2022. Jefferson County, West Virginia.

TMEIC Corporation. 2020. Sound Level Report – Ninja.

APPENDIX A FIGURES

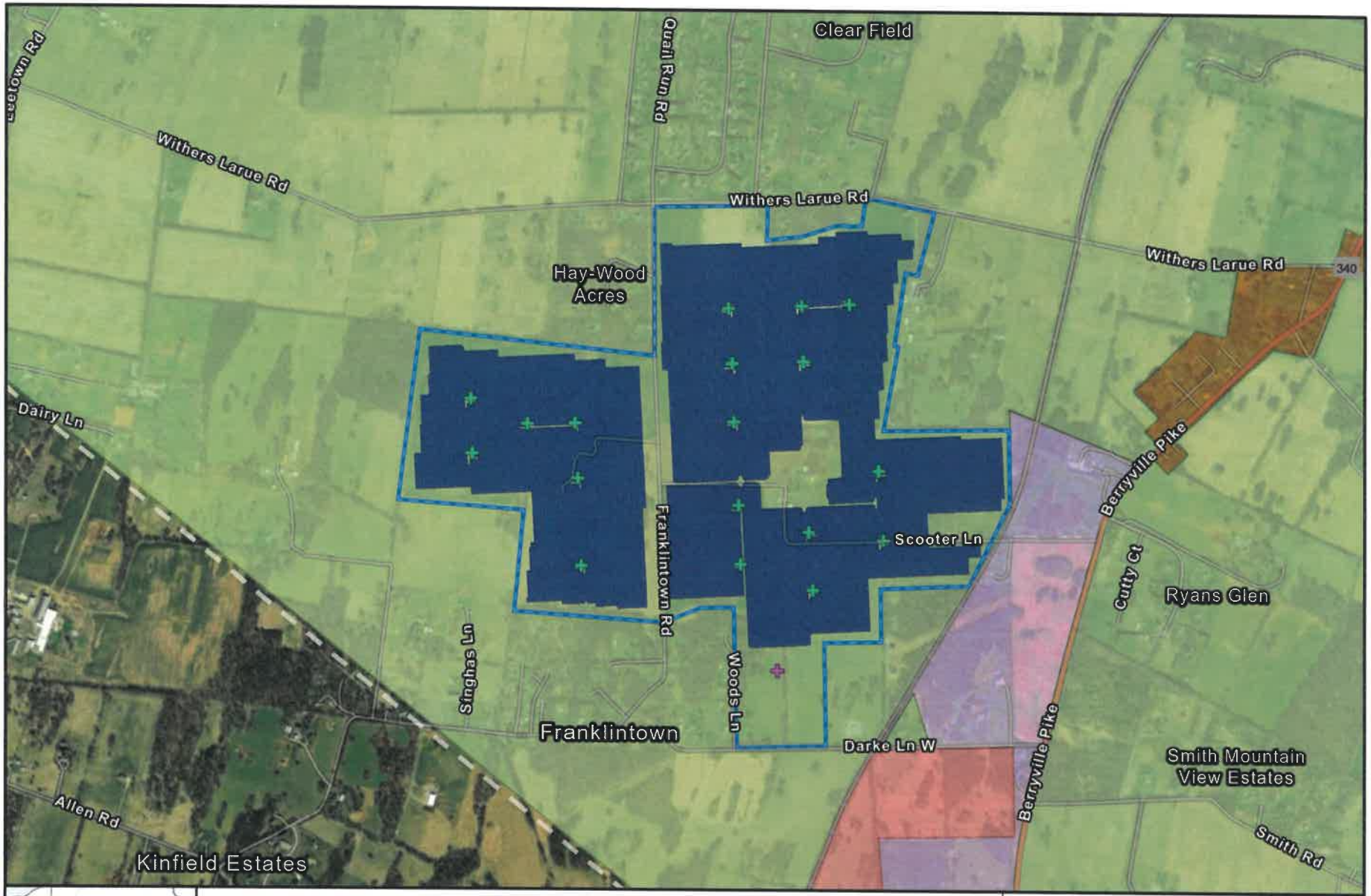

Figure 1
Project Area
Franklintown Farm Solar Project
Franklintown Farm Solar, LLC
Jefferson County, West Virginia

ERM

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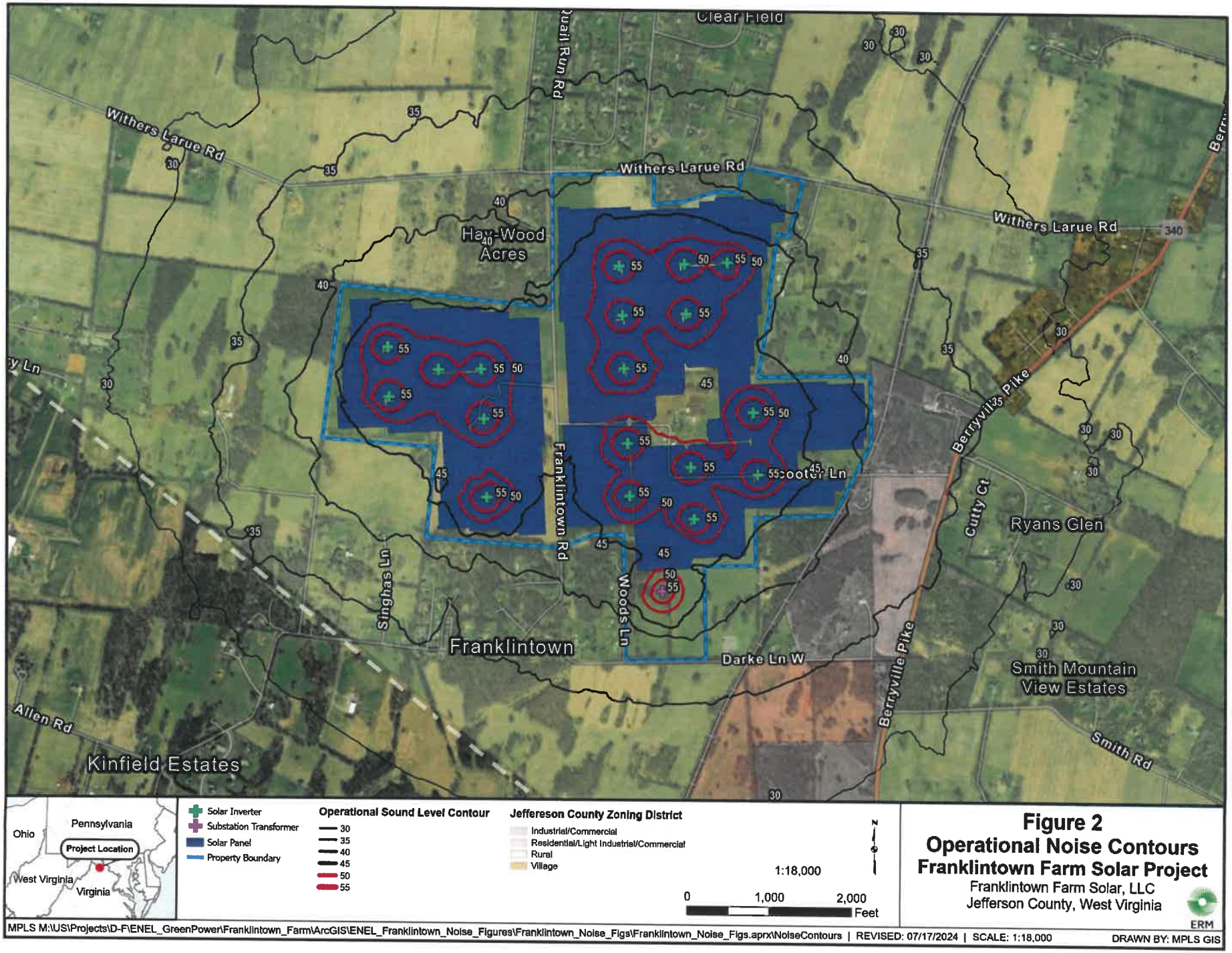

Figure 2
Operational Noise Contours
Franklintown Farm Solar Project
Franklintown Farm Solar, LLC
Jefferson County, West Virginia

ERM

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