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TECHNICAL MEMORANDUM

To:	Eric Redding, P.E. – Bergmann Associates, Architects, Engineers, Landscape Architects & Surveyors, D.P.C.
Copies:	Joseph Shanahan – Con Edison Clean Energy Businesses
From:	Christopher Bajdek and Emma Butterfield
Date:	June 25, 2021
Subject:	Operational Noise Levels from the Yorktown A Solar Farm in the Town of Yorktown, NY
Reference:	HMMH Project Number 312480.000

1. Introduction

HMMH was retained by Bergmann Associates, Architects, Engineers, Landscape Architects & Surveyors, D.P.C. (Bergmann) and Con Edison Clean Energy Business, Inc. (ConEd CEB) to conduct a noise study for the proposed Yorktown A Solar Farm on Foothill Street in the Town of Yorktown, New York. The objective of the noise study was to predict operational noise levels at selected locations in the community due to the battery energy storage system and ancillary equipment. This memorandum summarizes the applicable noise ordinance, presents the results of the noise modeling and operational noise assessment.

2. Town of Yorktown Ordinance

Section 300-81.5 G (7) of the Town of Yorktown, Code of Ordinances, addresses noise levels from battery energy storage systems and reads as follows:

> *"Noise. The one-hour average noise generated from the battery energy storage systems, components, and associated ancillary equipment shall not exceed a noise level of 60 dBA as measured at the outside wall of any nonparticipating residence and occupied community building. Applicants may submit equipment and component manufacturers' noise ratings to demonstrate compliance. The applicant may be required to provide operating sound pressure level measurements from a reasonable number of sampled locations at the perimeter of the battery energy storage system to demonstrate compliance with this standard."*

3. Predicted Operational Noise Levels

3.1 Noise Prediction Model

The SoundPLAN® computer noise model[1] was used for computing operational noise levels from the proposed solar farm to the closest noise-sensitive receptors in the surrounding community. An industry standard, SoundPLAN® was developed by Braunstein + Berndt GmbH to provide estimates of sound levels at distances from specific noise sources taking into account the effects of terrain features including relative elevations of noise sources, receivers, and intervening objects (buildings, hills, trees), and ground effects due to areas of hard ground (pavement, water) and soft ground (grass, field, forest). In addition to computing sound levels at specific receiver positions, SoundPLAN® can produce noise contour graphics that show areas of equal and similar sound level.

[1] SoundPLAN® Version 8 was used for the computations. Documentation provided in SoundPLAN® User's Manual, Braunstein + Berndt GmbH, 2015. U.S. sales and support services are available via Navcon Engineering Network, Fullerton, CA (http://navcon.com/www/sumpage/software/soundplan)

The sound propagation model within SoundPLAN® that was used for this study was ISO 9613-2.[2] This international standard propagation model is used nearly universally in the U.S. for environmental noise studies, due to its conservative propagation equations. ISO 9613-2 uses "worst-case" downwind propagation conditions in all directions, and accounts for variations in terrain and the effects of ground type.

3.2 Noise Model Input

As input, SoundPLAN® incorporated a geometric model of the study area and reference noise levels for the battery energy storage system and ancillary equipment, which are the predominant sources of operational noise associated with the proposed project. HMMH developed a three-dimensional geometric model of the study area based on aerial photography obtained from ESRI for off-site buildings and structures, ground elevation data from a third-party source,[3] and the site plan for the solar farm.[4] All off-site buildings were modeled as objects that both obstruct (attenuate) and reflect the sound emitted from a source with a 1 dB reflection loss. The SoundPLAN® model included reflections of the 3rd order. HMMH included the following sources of project-related noise included in the model:

- Three Tesla Megapack battery energy storage systems;
- 19 Chint inverters with an A-weighted sound pressure level of 65 dBA at a distance of 1 meter; and
- One 2,000 kVA transformer with a NEMA TR-1 audible sound level rating of 61 dB.

3.3 Presentation of Results: Predicted A-weighted Sound Levels

Table 1 summarizes the computed A-weighted noise levels due to the battery energy system and the ancillary equipment at the closest noise-sensitive land use in the surrounding community, including the closest residence at 3900 Foothill Street and the Putnam Valley High School.

Figure 1 shows the noise exposure contours produced by the proposed project in 5-decibel intervals. This figure also shows the effects of buildings and structures on sound propagation from the transformers. As shown in this figure the 60 dBA contour lies within the property lines of the site of the proposed project.

Table 1. Predicted A-weighted Sound Levels from the Proposed Project

Receptor No.	Description	Predicted Facility Noise Level (dBA)	Land Use
R-01	3900 Foothill Street; west façade	53	Residential
R-02	3900 Foothill Street; south façade	52	Residential
R-03	Putnam Valley High School; south façade	47	School
R-04	Putnam Valley High School; south façade	47	School
R-05	Putnam Valley High School; fence	49	School
R-06	Putnam Valley High School; parking lot	47	School

Source: HMMH, 2021.

[2] International Organization for Standardization (ISO), International Standard ISO 9613-2, "Acoustics – Attenuation of Sound during Propagation Outdoors", Part 2: General Method of Calculation, 1996-12-15.
[3] U.S. Geological Survey, 20210518, USGS Lidar Point Cloud NY_FEMAR2_Central_2018_D19 e1822n2249: U.S. Geological Survey.
[4] "Yorktown A Solar Farm Site Plans – Foothill Street – Town of Yorktown," prepared by Bergmann, October 27, 2020.

4. Conclusion

Based on the modeling results, the operation of the battery energy storage system (consisting of three Tesla Megapacks) and the ancillary equipment (19 Chint inverters plus one transformer) meets the Town's 60 dBA sound level limit at the closest noise-sensitive land use in the surrounding community.

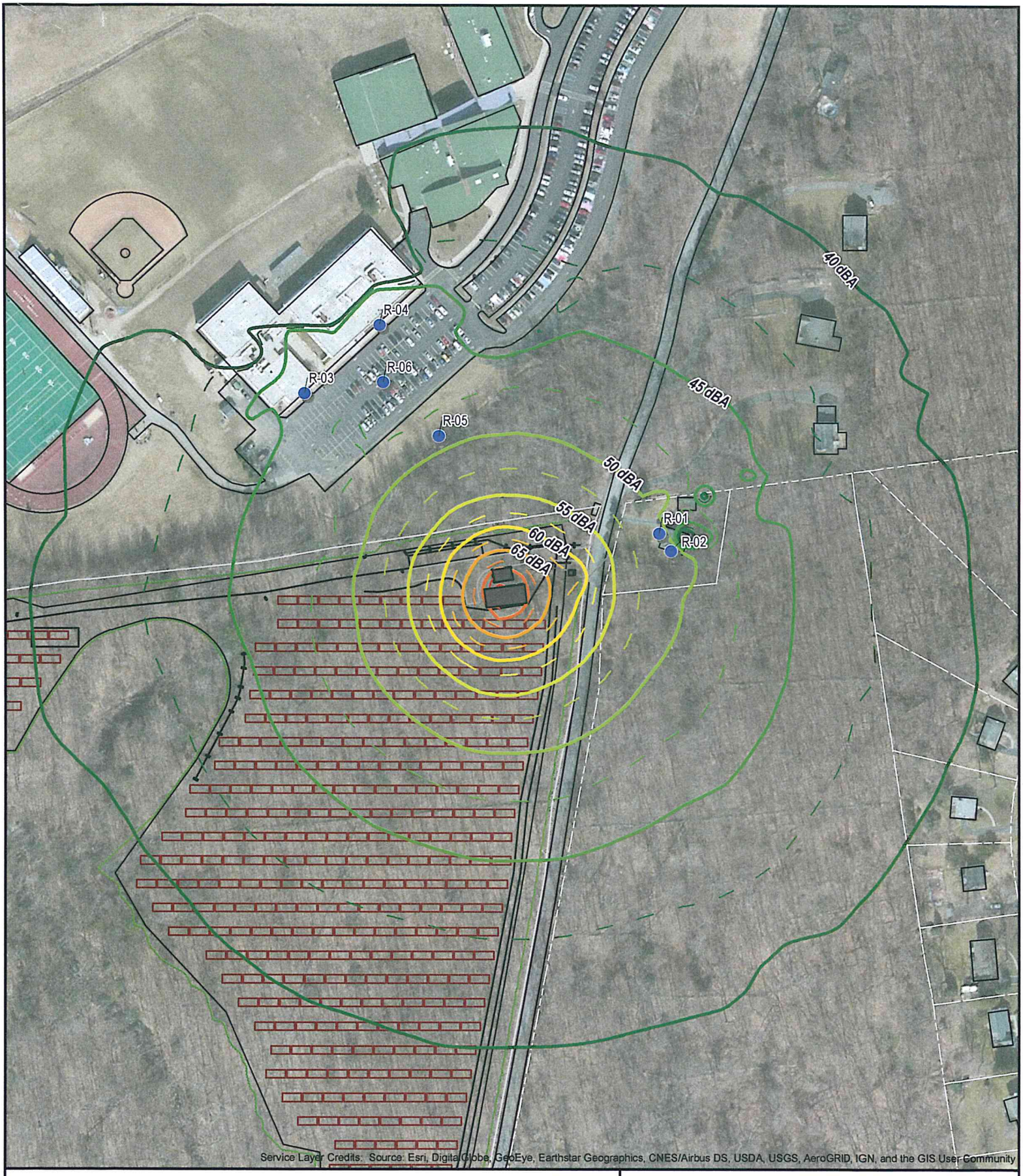

Figure 1:
A-Weighted Sound Level Contours due to the Yorktown A Solar Farm

Town of Yorktown, NY