

EXHIBIT Q:

Acoustic Study

Nutmeg Solar Project
Enfield, Connecticut



September 25, 2018

Ms. Briony Angus, AICP
Senior Project Manager/ Associate
Tighe & Bond, Inc.
53 Southampton Road
Westfield, MA 01085

Re: Nutmeg Solar PV Farm, Enfield, CT – Revised Acoustic Analysis

Ref. 4212

Dear Ms. Angus:

This letter report presents the results of a revised acoustic study for the Nutmeg Solar Project in Enfield, CT. The ground-based solar panels will cover an area of approximately 100 acres, within which equipment pads will house twelve (12) inverters for converting Direct Current (DC) to Alternating Current (AC), and one substation with an 18/24 MVA power transformer to step-up the voltage of power delivered to the utility grid. These sound sources will only operate in the daytime when electricity is produced by the solar panels.

The Decibel Scale for Sound and the Connecticut Sound Limit

All sounds originate with a source – a human voice, vehicles on a roadway, or an airplane overhead. The sound energy moves from the source to a person's ears as sound waves, which are minute variations of air pressure. The loudness of a sound depends on the sound pressure level, which has units of decibel (dB). The decibel scale is logarithmic to accommodate the wide range of sound intensities to which the human ear is subjected. On this scale, the quietest sound we can hear is 0 dB, while the loudest is 120 dB. Every 10-dB increase is perceived as a doubling of loudness. Most sounds we hear in our daily lives have sound pressure levels in the range of 30 dB to 90 dB.

Community noise studies and regulations use an A-weighting scale (dBA) when measuring sound pressure levels as this approximates the response of the human ear to sounds we experience in everyday life. Typical sound levels associated with various activities and environments are presented in Figure 1. Here are examples of sound levels we all encounter. A quiet suburban area at night without any traffic typically has an average sound level of 40 to 45 dBA. The freight train you hear in the distance may be 50 dBA, and crickets and tree frogs in the summer sing a sound level of 55 dBA. Two people having a conversation in a normal tone of voice will hear each other speak at 65 dBA. Standing near a road, a car passing by can produce 75 dBA, and a truck passing by is louder at 80 dBA. The Connecticut Department of Environmental Protection (CTDEP) daytime sound limit for residential areas of 55 dBA¹ is used in this study to assess the potential sound impacts from the project. Enfield has a noise bylaw that has noise limits identical to the DEEP limits.

¹ Connecticut General Statutes Section 22a-67 *et seq.* and Regulations of Connecticut State Agencies ("R.C.S.A.") Sections 22a-69-1 to 22a-69-7.4.

Predicted Project Sound Levels

Future sound levels from the Nutmeg Solar Project, when it is producing maximum electrical power, were calculated with the Cadna A acoustic model. Cadna A is a three-dimensional model for sound propagation and attenuation based on International Standard ISO 9613². Atmospheric absorption, the process by which sound energy is absorbed by the air, was calculated using ANSI S1.26-1995.³ Ground surfaces were assumed to be semi-reflective (a ground factor of 0.5), approximating worst-case, winter frozen ground conditions. Digital terrain data for the project areas were analyzed to obtain terrain heights. The model assumes the most-favorable sound propagation conditions, as occur under downwind conditions or during a ground-based temperature inversion on a clear night. At other times, atmospheric turbulence and wind shadow effects will reduce sound levels by 5 dBA to 20 dBA from those presented below.

Sound power levels for the inverters at Nutmeg Solar were obtained from manufacturer's specifications for the 2.7 MW inverters⁴. Sound data for the 18/24 MVA transformer was calculated based on reference data for transformers.⁵ Sound levels were predicted at the 21 residential locations, listed in Table 1. Figure 2 shows the layout plan for the Project's solar panels and the nearby residences, and a decibel-level contour map of maximum Project sound levels is presented in Figure 3. Predicted maximum sound levels for each residence are listed in Table 1.

Maximum sound levels at nearby residences will range from 13.5 to 37.0 dBA, and all predicted sound levels are far below the 55 dBA daytime sound limit set by CTDEP. The highest predicted sound level of 37.0 dBA is predicted for the residence at 18 Bailey Rd. All predicted sound levels are very low, and it is unlikely that sound from Nutmeg Solar Project will be noticeable on nearby residential properties. If the proponent decides to use the 1.667 MW inverters⁶, the predicted sound levels would be approximately the same at nearby residences.

Please call if you have any questions regarding this report.

Sincerely,

TECH ENVIRONMENTAL, INC.



Marc C. Wallace, QEP, INCE
Vice President
4212/Sound Report September 2018

² International Standard, ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors, -- Part 2 General Method of Calculation.

³ American National Standards Institute, ANSI S1.26-1995, "American National Standard Method for the Calculation of the Absorption of Sound by the Atmosphere," 1995.

⁴ TMEIC PVH-L2700ER/PVH-L2500ER 2.5-2.7-MW Inverter.

⁵ Edison Electric Institute, Electric Power Plant Environmental Noise Guide, 1983.

⁶ Solar Ware Samurai PVL-L1883GRQ 1667 kW Inverter.

TABLE 1

**PREDICTED SOUND LEVELS AT NEARBY RESIDENCES
FROM THE NUTMEG SOLAR PROJECT AT MAXIMUM POWER**

Residence Address	Maximum Sound Level (dBA)
9 Taft Lane	16.0
11 Taft Lane	16.2
15 Taft Lane	16.1
17 Taft Lane	16.0
19 Taft Lane	15.7
9 Taft Lane	15.3
4 Taft Lane	14.2
6 Taft Lane	14.2
8 Taft Lane	14.4
2 Wilson Court	14.4
2 Charnley Road	18.6
4 Charnley Road	17.3
6 Charnley Road	16.5
7 Charnley Road	13.5
3 Charnley Road	18.0
7 Charnley Road	16.5
18 Bailey Road	37.0
58 Broadbrook Road	20.4
59 Broadbrook Road	21.4
45 Broadbrook Road	20.7
12 Bailey Road	24.9
52 Bailey Road	21.3
32 Bailey Road	26.1
22 Bailey Road	31.1

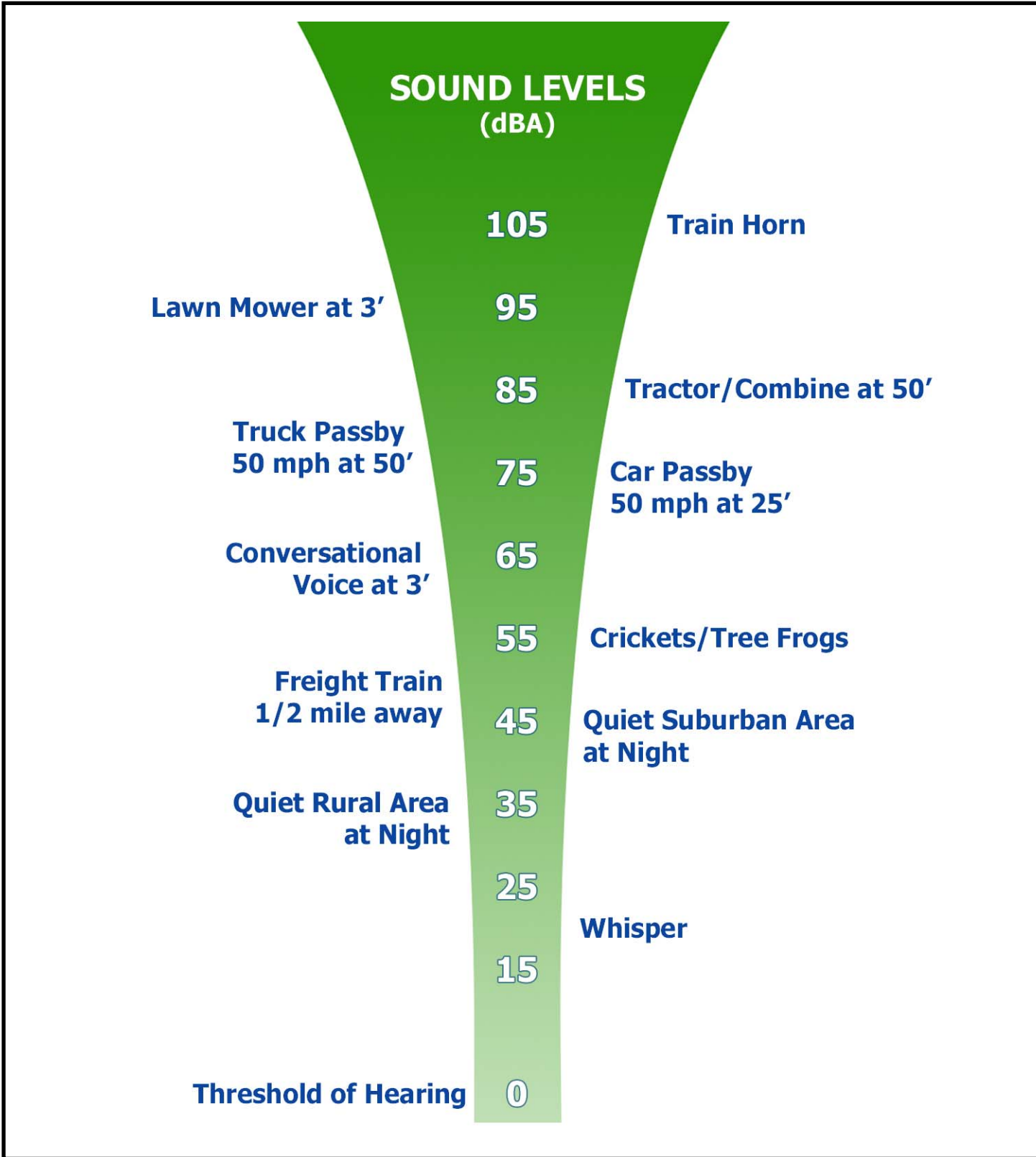


FIGURE 1.
Common Outdoor Sound Levels

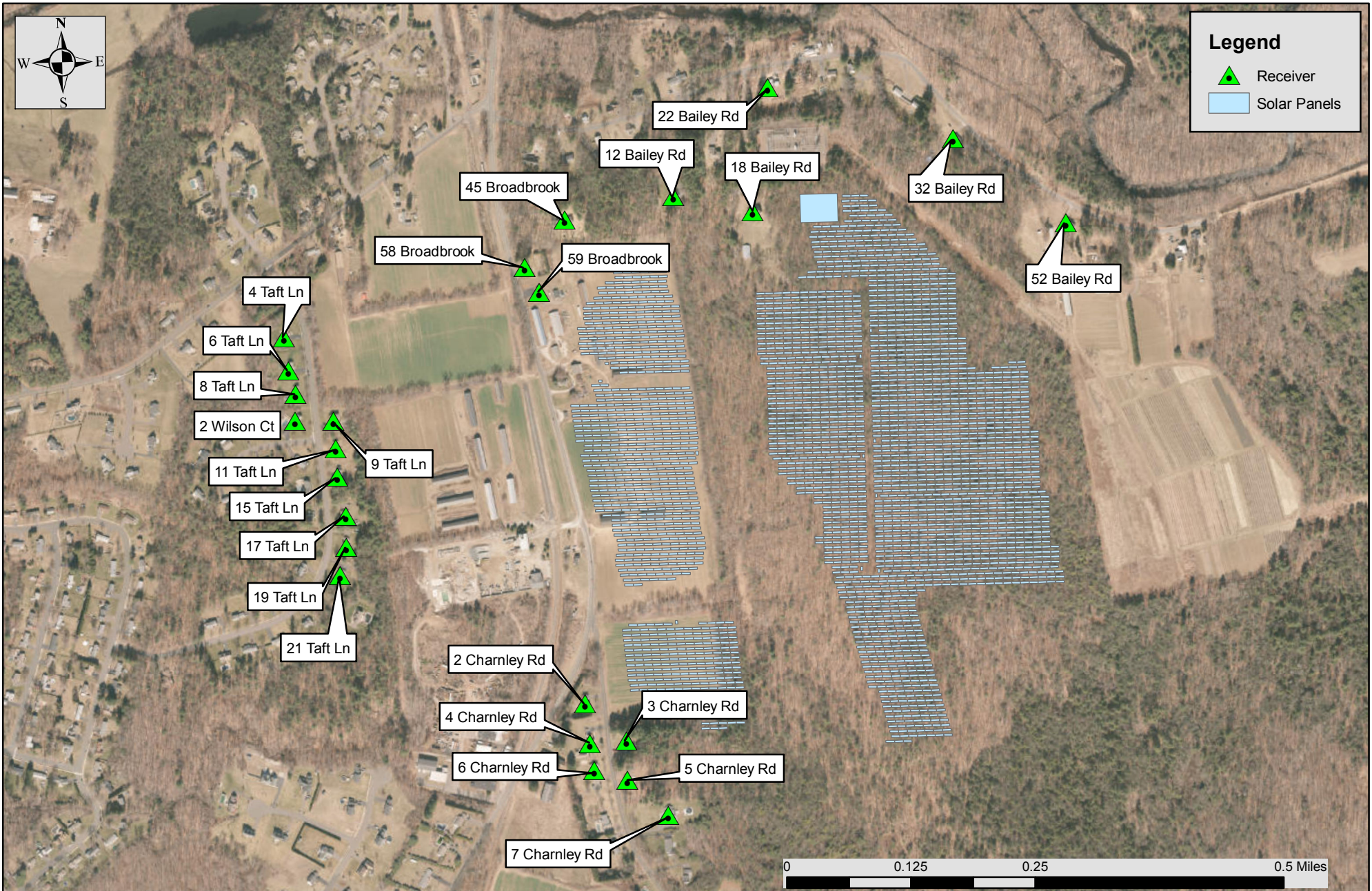


Figure 2
Layout Plan for Nutmeg Solar Farm and Nearby Residences
Nutmeg Solar Farm
Enfield, CT

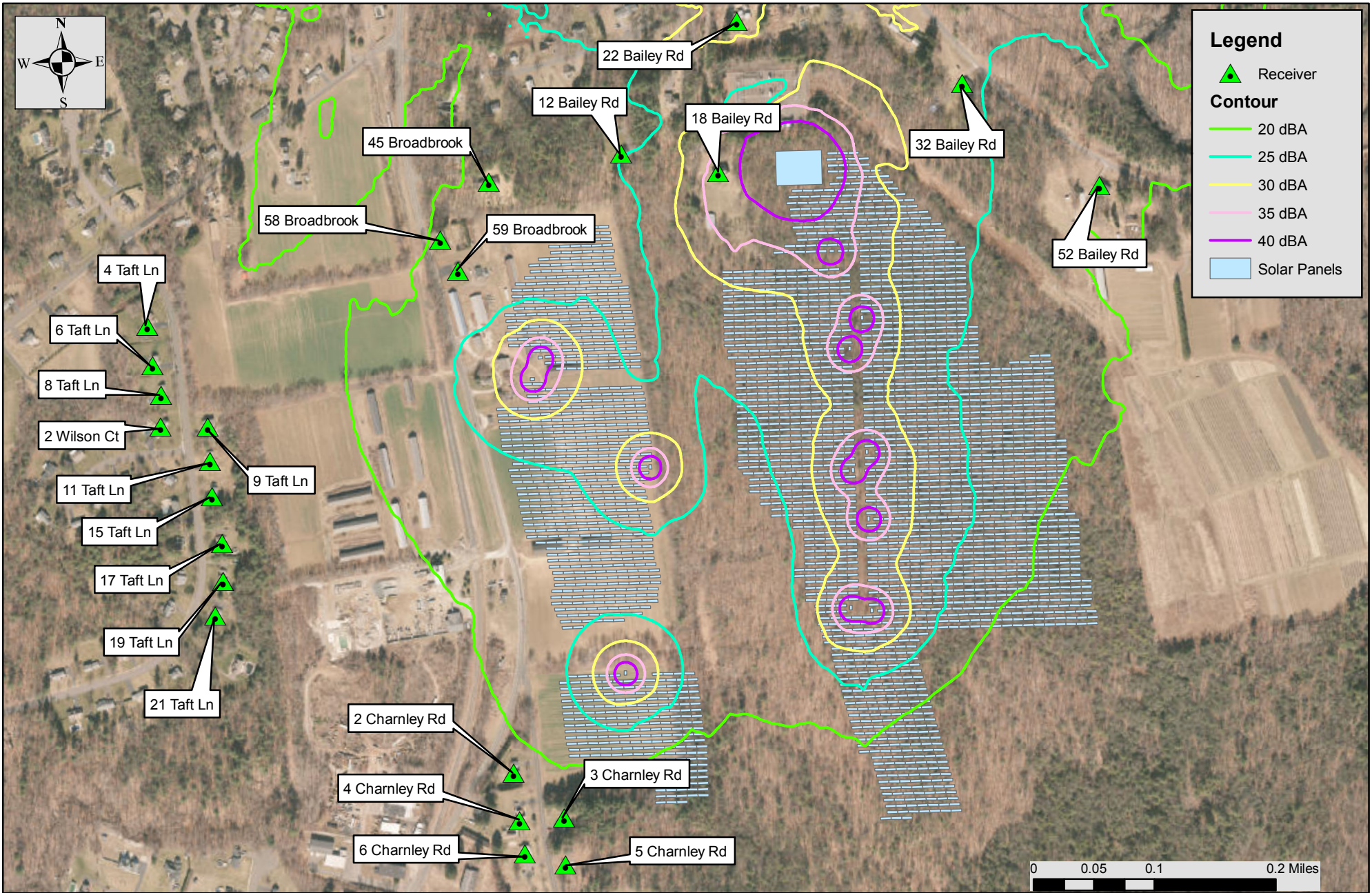


Figure 3
Sound Levels from the Project at Maximum Power Output
Nutmeg Solar Farm
Enfield, CT