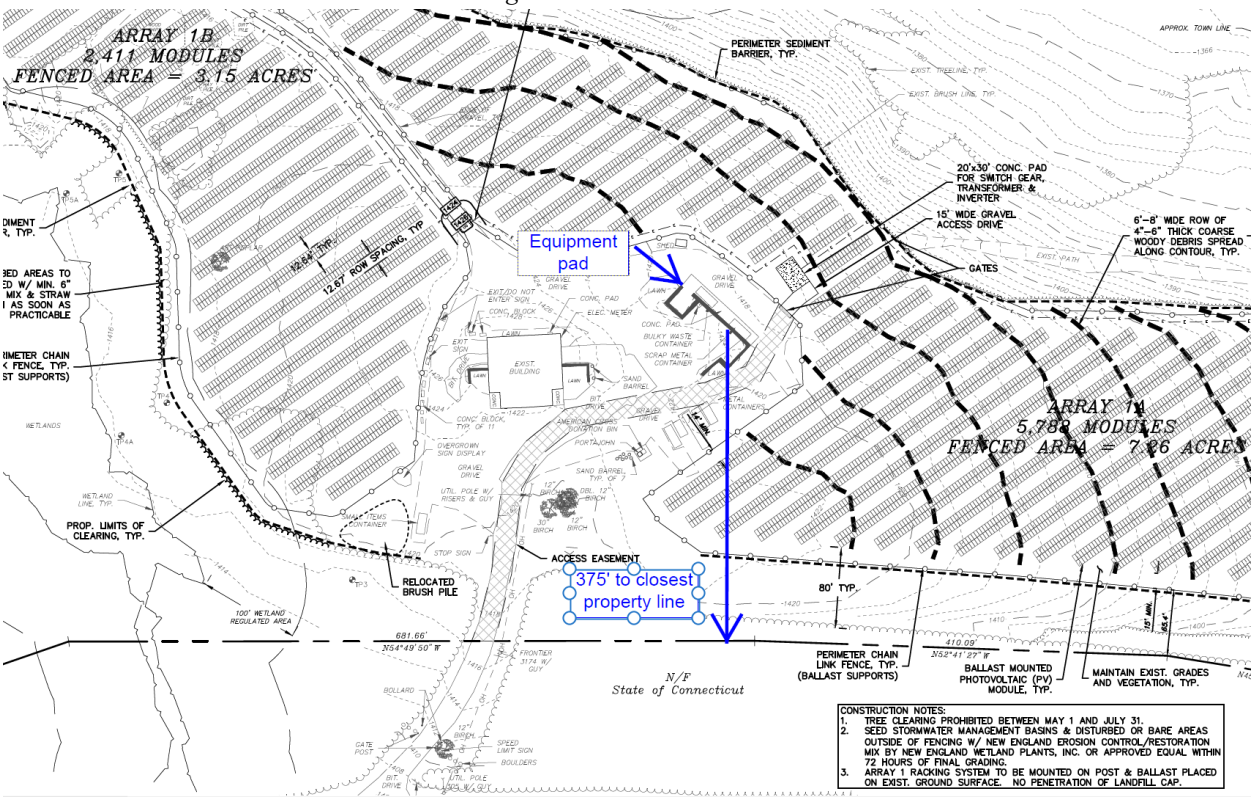
LODESTAR ENERGY

NOISE ANALYSIS

Introduction

Noise generated by this project will derive from the operation of (32) Sungrow SG125HV 125 kW inverters and (2) Eaton 2000kVA transformers. All proposed inverters are designed to be installed on a single equipment pad at the location illustrated in Figure 1 below. According to the Sungrow equipment specification sheet, a single inverter has an acoustic noise output of 53.7dBA at 1 meter (3.28 ft) from the unit and a single Eaton transformer has an output of 61dBA at 1 meter (3.28ft). The equipment pad's proximity to the closest property line is 375ft.

Figure 1: Inverter location



As stated in Regulations of Connecticut State Agencies Sec. 22a-69-3.5, noise deriving from uses within commercial-industrial zones shall not exceed 62-70dBA in order to minimize disturbance to abutting and adjacent property owners.

Methods/Analysis Sound Intensity of All Equipment at a Common Point

To quantify the noise output of all inverters, a logarithmic formula is required to accurately determine amplification of sound. This formula and the processes related to calculating a result are illustrated below.

Equation 1. Decibel Addition

$$L = 10 \log_{10} \left(\sum_{i=1}^{n} 10^{(L_i / 10)} \right)$$

(1) Sungrow SG125HV 125 kW inverter = 53.7dBA at 3.28ft
(32) Sungrow SG125HV 125 kW inverters = **68.7dBA at 3.28ft**
(1) Eaton 2000kVa transformer = 61dBA at 3.28ft
(2) Eaton 2000kVa transformers = 64dBA at 3.28ft
(32) Sungrow SG125HV 125 kW inverters + (2) Eaton 2000kVa transformers = **70dBA at 3.28ft**

To quantify the reduction in sound from the point of origin to the closest property boundary (115ft away) and the closest residence (265ft away), the formula stated in Equation 2 utilizes the inverse square law for sound intensity. This formula states that the reduction in sound pressure is relative to the distance from the source.

Equation 2. Audibility

The proposed Project design includes the installation of inverters. The 32 inverters and two transformers combined have a 70 dBA output. To quantify the reduction in sound from the point of origin to the closest property boundary (375 feet away), the formula utilizes the inverse square law for sound intensity. This formula states that the reduction in sound pressure is relative to the distance from the source. The formula is set forth below in equation 1 and applied to the instant case in which proposed site conditions are calculated:

Equation 1. $DL = L_{P2} - L_{P1}$

Calculation

$$DL = 10\ log\ log\ (R_2/R_1)^2$$

$$DL = 20log\ (R_2/R_1)$$

$$DL = 20\ log(375/3.28)$$

DL= 41.16 dBA

70 dBA – 41.16 dBA = 28.84 dBA

Variables:
DL = difference in sound pressure (dBA)
L_{P1} = Sound pressure level at location 1
L_{P2} = Sound pressure level at location 2
R_1 = distance from source to location 1
R_2 = distance from source to location 2

Conclusion

In conclusion, considering the closest property line at 375' from the equipment pad (point of origin of noise emanation), the noise levels emitted from the inverters and transformers will be 29.84 dBA at the property line. Noise will be further reduced at farther property lines. Therefore, the proposed Project and its components comply with the applicable regulations, well below 62-70 dBA.