Appendix 19-4:

Annual Daytime-Nighttime Calculations

Daytime and Nighttime Sound Level Calculations

Over the course of a year, sound levels associated with the normal operation of the inverters will at times be less than the modeled worst-case / short-term sound levels due to the presence of cloud cover. In order to quantify this reduction, differences in the operational vs non-operational inverter sound power levels due to the presence of clouds or lack of sunshine were calculated. The inverters were assumed to be non-operational and therefore producing no sound during any period without sunlight either after sunset and before sunrise, or when clouds were present. During periods with sunshine and no clouds, the inverters will be operational and are assumed to be operating at their maximum sound power levels.

Site-specific daily sunrise and sunset data corrected for daylight saving time were used to calculate the maximum theoretical sunshine for a year. This represents the total amount of time between sunrise and sunset for each day within a year. Table 19-4.1 presents these results. Monthly site-specific sunshine probabilities, measured in Syracuse, NY, displayed in Table 19-4.2, were applied to the maximum theoretical monthly sunshine values to calculate the expected monthly sunshine. The inverter was assumed to operate during any period with potential sunshine. The expected inverter operation was thus assumed to be any period of potential sunshine in which no clouds would be present.

From these data, the inverters would operate at most 50.9% of the year if no clouds ever passed over the site, and 5.6% of the nighttime hours (10 PM to 7 AM) within a year. The nighttime inverter operation is due to sunrise occurring before 7 AM for part of the summer.

The sound level exceeded for 10% of the time over the course of one year (L_{10}) was also calculated, as well as the sound exceeded for 50% of the time over the course of one year (L_{50}). NYCRR §1001.19(f)(5) and (f)(6) respectively requires that the future noise levels (L_{10} and L_{50}) be evaluated for "normal operating conditions". Therefore, periods where the facility could not be operating, due to no potential sunshine were excluded from the calculations. The expected annual operational time was found to be 46.6% of the potential minutes of operation in a year as seen in Table 19-4.3. Because the percent of expected yearly operation (46.6%) was found to be less than 50% of the potential yearly operation, but more than 10%, the annualized L_{10} sound power levels will be equal to the short-term L_{eq} sound power level of the inverters. To be conservative, the median sound level from the project (L_{50}) was assumed to be the same as the highest short-term daytime sound level. Therefore, the L_{50} modeled sound levels from the project will be the same as the L_{10} sound levels from the project.

Table 19-4.1 Summary of Maximum Annual On-Site Sunshine (2021)

Annual Time Period	Maximum Minutes in Period [min]	Maximum Sunshine in Period [min]	Maximum Percent of Period in Operation
Total	525,600	267,577	50.9%
Nighttime	197,100	11,043	5.6%
Daytime	328,500	256,534	78.1%

Table 19-4.2 Summary of Monthly Sunshine Probability

Month	Possible Sunshine
January	34%
February	39%
March	46%
April	53%
May	53%
June	54%
July	60%
August	57%
September	51%
October	40%
November	25%
December	23%

Table 19-4.3 Summary of Maximum and Expected Operational Minutes (2021)

Annual Time Period	Maximum Operational Time [min]	Expected Operational Time [min]	Percent of Maximum Operational Time Expected to Occur
Total	267,577	124,646	46.6%
Nighttime	11,043	6,044	54.7%
Daytime	256,534	118,602	46.2%