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12 Latti Farm Road Noise Survey

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Introduction

On July 16, 2019 J&A Enterprises made measurements of ambient airborne noise for the CoGrow Building at 12 Latti Farm Rd, Millbury, MA. Several locations were chosen to give a proper assessment of the ambient noise in the area. The locations were chosen based on their proximity to the building. This report includes the measured results and initial findings.

As of March 2, 2021, the noise levels are being revised to assess the impact of a new chiller and cooling tower configuration for the facility. The original CoGen Unit and Chiller Units are being exchanged for a Daikan modular unit with a Tecochill plant and Evapco Closed Circuit Coolers installed on top. Noise levels are expected to change slightly with the different equipment.

Instrumentation and Measurement Method

Noise measurements were made using J&A equipment, all having current calibration certificates from independently certified calibration laboratories. The instrumentation used is listed below in Table 1

Table 1: Equipment List with calibration due dates




Type / Model / Manufacturer	Serial Number	Calibration
Analyzer / Soundbook 3 / Sinus Messtechnik	7116	20-Nov-20
Acoustic Calibrator / Cal200 / Larson Davis	3792	15-Oct-20
Sound Level Meter / B&K 2250 / Bruel & Kjaer	3004365	21-Aug-19

Calibration Certificates available upon request

Measurements were made using a single microphone set up on a tripod at 1.5m above the ground. The measurements were made for 10 minutes at each location at various times throughout the night (see Table 2). Time signal, L90, and Overall (LAeq) values were measured and stored.

Measurement Locations

Measurements were made at the following locations:

-  12 Latti Farm Road where the Daikan modular unit will be installed
-  Global Direct building at 9 Latti Farm Road
-  Primrose Lane – Neighborhood nearby

The locations above are shown on the map in Figure 1.



Figure 1: Map of measurement locations

Measurement Values

The measured noise levels, dBA are reported in Table 2. Measurements were taken starting at 7:00pm Tuesday night (July16, 2019) until 2:31am Wednesday morning (July 17, 2019). This was done to assess noise during high traffic into the quiet hours of the night.

The major source of noise in the area is road/traffic noise from the Mass Turnpike.

Table 2: Measured L90 and LAeq

Location	Start Time	File	L90 (dBA)	LAeq (dBA)
12 Latti Farm Rd	7:10pm	4	60	64
Global Direct Building	7:30pm	5	52	54
Neighborhood	7:50pm	6	56	58
12 Latti Farm Rd	8:10pm	7	59	63
Global Direct Building	8:24pm	8	52	54
Neighborhood	8:42pm	9	54	57
12 Latti Farm Rd	9:00pm	10	57	62
Global Direct Building	9:15pm	11	53	54
Neighborhood	9:32pm	12	54	58
12 Latti Farm Rd	10:00pm	13	57	62
Global Direct Building	10:23pm	14	53	56
Neighborhood	10:45pm	15	54	57
12 Latti Farm Rd	11:02pm	16	56	62
Global Direct Building	11:17pm	17	51	53
Neighborhood	11:34pm	18	51	55
12 Latti Farm Rd	12:00pm	19	55	61
Global Direct Building	12:15pm	20	51	55
Neighborhood	12:34pm	21	52	55
12 Latti Farm Rd	1:00am	22	53	60
Global Direct Building	1:15am	23	49	52
Neighborhood	1:33am	24	49	54
12 Latti Farm Rd	2:00am	25	51	60
Global Direct Building	2:15am	26	48	51
Neighborhood	2:31am	27	49	54

Summary of Results

As of March 2, 2021, J&A has been supplied with the noise spectrum produced by the Tecochill Chiller plant and the Evapco Closed-Circuit Cooler. The overall noise level of the Tecochill Chiller Plant is 67dBA at 15.2m. The noise levels used for the noise prediction are for the standard configuration of the chiller plant alone with noise enclosures over the two engines. Levels will likely be lower with the chiller plant installed in the modular enclosure designed by Daikan. This enclosure is reported to be metal walls with sound insulation installed, which is expected to lower the noise levels of the Tecochill plant outside the full enclosure.

The noise level produced by the Closed-Circuit Cooler is 67dBA at 15.2m for a single unit. Since two cooler units will be installed, the combined noise levels will be 70dBA at 15.2m.

By adding all the noise sources together, we get a combined noise level of 72dBA at 15.2m. Using this information and assuming spherical spreading of sound, J&A was able to make a simple calculation of noise levels at each location. The simple calculation was done by the equation:

$$L_{At\ Location} = L_{source} - 20 \log \left(\frac{Distance\ to\ Measurement\ Location}{Reference\ Distance} \right)$$

$L_{source} = 72\text{dBA}$

Reference Distance = 15.2m (reference given in specification)

The distances to each measurement location are as follows:

- To Global Direct Building: 145.4m
- To Primrose Lane (Residential Area): 396.1m

Assumptions Made:

- +3dBA caused by reflection of noise off the CoGrow building (used to calculate noise at Global Direct building)
- Barrier Effect of CoGrow Building on the noise transmission to Primrose Lane (Residential Area) assumed to be 0dB to be conservative
- Tecochill unit noise is measured for a complete unit assembly

Using the equation above, the noise level at the Global Direct building would be 55.4dBA. For this position, an assumption on reflection of noise off the CoGrow building is made. This assumption is an added 3dBA to the equation. The calculated level at the Global Direct building is 7dBA higher than the measured L90 at 2:15am. This will be a noticeable increase in noise at this time of night. This is within the allowable 10dBA increase in noise to the ambient as stated by the Massachusetts state noise ordinance. However, this predicted noise level is only 3dBA above the L90 level measured at 7:30pm and therefore should not be a perceivable increase in noise during normal daytime working hours.

At Primrose Lane (Residential Area) the noise level of the CoGrow mechanical noise is calculated to be 43.7dBA. Again, we assume the barrier affect caused by the CoGrow building to be 0dB to keep the predicted noise levels conservative. The calculated level at Primrose Lane is 6dBA lower than the measured L90 level at 2:31am. With such a large distance between the Residential Area and the Tecochill unit and Closed-Circuit Cooler units, the noise produced by the units should not be heard in the Residential Area.

The reason we are looking at the 2:00am levels is due to this being a time when ambient noise is lowest and is the strictest test of audibility. However, these calculations are based on the assumptions listed above.

Noise Limits/Ordinance

According to Massachusetts noise ordinance *310 CMR 7.10*, noise source levels are not to increase the broadband sound level by more than 10dBA above ambient or produce a puretone. Ambient noise is the background A-Weighted noise level exceeded 90% of the time (L90).

For this report, the Massachusetts state noise ordinance was used. Based on the calculations made, the noise produced by the Tecochill unit and Closed-Circuit Cooler units is predicted to be within the noise ordinance criteria of no more than 10dBA added to the ambient noise. A 24 hour L90 measurement will be greater than the measured L_{Aeq} at 2:00am.

Conclusion

The information in this report is based on a simple calculation based on the reported data of the Tecochill unit and Closed-Circuit Cooler unit. It is important to remember that the noise levels of the Tecochill unit will likely be lower when installed inside the Daikan modular enclosures. With additional data, such as spectral data, we can make more precise calculations. This would likely give lower values than what we have given with our simple, conservative calculation.

Our initial findings show that the installation of the Tecochill unit should not be perceivable in the Residential Area at Primrose Lane. At the Global Direct Building, the noise from the Tecochill unit and Closed-Circuit Cooler unit will be perceivable during quiet hours (2:30am), but during normal working hours during the day the noise will be equal to or less than the ambient noise measured at the Global Direct Building. The noise produced by the Tecochill unit and Closed-Circuit Cooler units falls within the allowable 10dBA increase above the ambient as stated in the Massachusetts state noise ordinance. The noise produced by the Tecochill unit and Closed-Circuit Cooler unit will certainly be heard at the CoGrow building.

All measurements have been archived and are available upon request.