Thunder Hearing & Sound, LLC
847 South Randall Road, #218 Elgin, IL 60123
855-566-7488 www.ThunderHearing.com

Warrenville Dream Clean Sound Impact Study

March 14th, 2025

Prepared for:
Dream Clean Car Wash – 625 Greenleaf, Wilmette, IL 60091

Thunder Hearing & Sound was asked to study the noise radiated from the proposed Dream Clean Car Wash facility North of Duke Parkway and East of Route 59 in Warrenville, IL. As shown in **FIGURE 1**, this plan includes a 152-foot tunnel with automated wash equipment and 20 vacuum stalls. Because these operations generate noise, we were asked to evaluate the potential impact of this noise on the adjacent residential community.

Applicable Noise Regulations

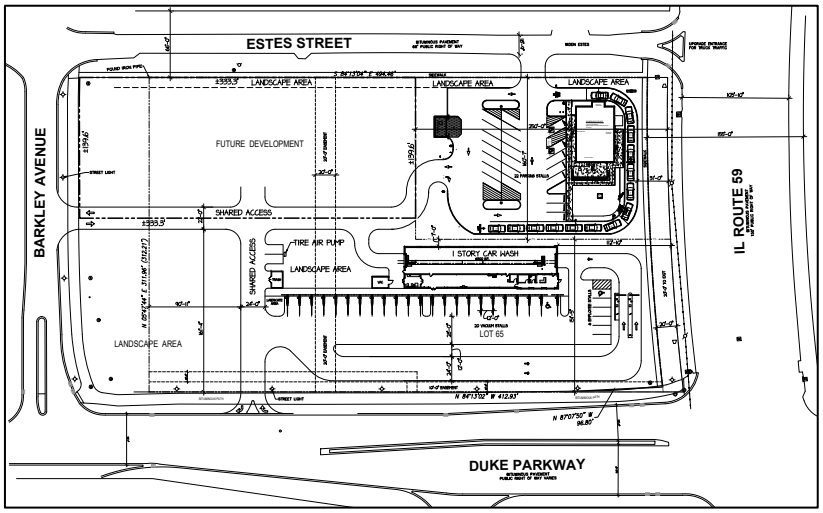


Figure 1 – Site Plan.

The City of Warrenville noise code limits sound by groups of frequencies (called octave bands). However, the upper and lower frequencies of these bands were changed in the 1970s. We mathematically converted these limits to the modern octave-band frequencies over nine octaves ranging from 32 Hz to 8,000 Hz - nearly the full range of hearing. For simplicity, when no particular frequency dominates the sound (like a humming or squealing sound), these limits can be logarithmically summed to establish a single, overall noise level limit. Also included in the code are adjustments to be made for nighttime (-5 dB) and commercial properties (+5 dB).

For noise radiated from commercial property to residential property, the equivalent overall limit is 60 dB(A) for the daytime hours and 55 dB(A) for the nighttime hours (7:00 PM to 7:00 AM). For noise radiated from commercial property to business property, the overall limit is 67 dB(A) for the daytime hours and 62 dB(A) for the nighttime hours (7:00 PM to 7:00 AM). For reference, 60 dB(A) is the level of casual conversation while 50 dB(A) is half as loud and about the level of a dishwasher.

Ambient Noise Assessment

Regardless of any numerical limit, the impact of a noise source depends primarily on its audibility. To assess the degree of audibility, we evaluated the existing ambient noise by visiting the site on Tuesday, February 25th, 2025. During our visit, we inspected the topography of the site, examined the surrounding area, characterized the ambient noise, identified its sources, and set up professional-grade equipment to record the noise.

Figure 2 – Ambient Sampling Location

The recording ran for a nominal 24-hours to sample the background noise during a typical day at the location shown in **FIGURE 2**. This location was chosen because the distance to Route 59, the major noise source in the area, was similar to the nearest homes.

The recordings were analyzed to generate ambient sound level data at 1-second intervals. The result of this analysis can be seen in **FIGURE 3**. This graph calls out several events of loud cars and trucks passing by. The primary noise source was traffic from Route 59 with a higher truck mix than typical, likely due to the nearby truck stop. There was some construction noise in the area, but it did not cause an appreciable change in the ambient noise levels.

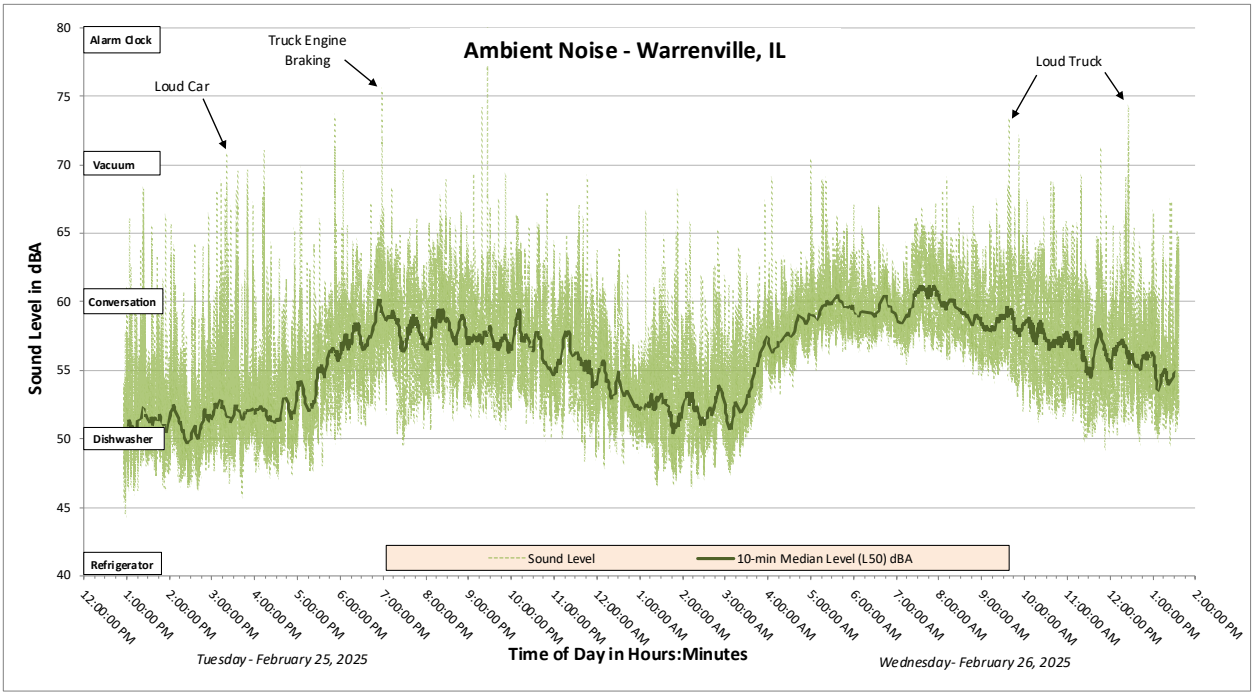


Figure 3 – Sound Level Trace of Ambient Noise

The thin green line in **FIGURE 3** shows the sound level each second. To better visualize the trend of the ambient noise, we computed the 10-minute median level, shown as the thick green line. Also known as the L50 level, the median level is a common acoustical measure that gives the level of sound exceeded 50% of the time. This median level is a good measure of the background ambient noise. During the recording, the 1-hour median levels (L_{A50}) ranged from **51 dBA to 60 dBA**.

Source Noise

To assess the sound emissions of the site we captured sound from a similar car wash (Drive Well Auto Spa in Mount Prospect, IL) with the same equipment planned for the Dream Clean car wash and a 151 ft tunnel. The 18 total dryers/blowers at this car wash are shown in **FIGURE 4**. We set up professional-grade equipment to record the noise and then analyzed the recordings in our lab to calculate the sound levels due to the car wash. Based on this analysis, the car wash produces a sound level of **77 dBA 50 ft from the exit** and **63 dBA 50 ft from the entrance** when under a full load of cars. We used the same approach for the vacuums and found the vacuums were **63 dBA at 50 ft** for normal activity.

Figure 4 – Mount Prospect Car Wash Dryers

Sound Modeling

To predict the sound levels radiated from Dream Clean Car Wash, we used an internationally accepted software program called SoundPlan™. This program calculates the sound level at millions of distant points based on the source sound levels, the topography of the site, reflections from buildings, the ground reflections from the parking lot, absorption by the atmosphere, diffraction from vegetation, and shielding from berms and structures. The program calculates the time-averaged levels based on the source data we input, in this case, our measured data from Drive Well Auto Spa in Mount Prospect, IL. Based on these calculations, the program generated color sound-level contours surrounding the site.

We positioned the noise sources as shown in **FIGURE 1** (the site plan), with the west side of the car wash as the exit and the east side as the entrance. We placed a sound source in each vacuum stall for the model. Each noise source was given a usage pattern from a similar car wash, with low usage in the morning and peak usage in the evening (5:00 PM – 7:00 PM). The peak usage represents the car wash at full capacity with the blowers on 100% of the time and doors open; a worst-case scenario.

Table 1 – Perceptual Difference as a Function of the Decibel Increase

Decibel Increase	Perceptual Difference	Impact
1-2 dB	Negligible	None
3-4 dB	Just Noticeable	Slight
5-6 dB	Clearly Noticeable	Mild
7-8 dB	Strongly Noticeable	Moderate
9-10 dB	Doubling in Loudness	Substantial

FIGURE 5 shows the projected audibility contours during the daytime. To create the contours, we set the green color on the legend to 51 dBA, the lowest ambient noise level during the day (1:00 PM to 3:00 PM). Each color change on the contours represents a change of 3 dB, which is a "just noticeable" change (see **TABLE 1**). The red line is the Warrenville residential daytime limit of 60 dBA. We chose four points - represented by blue dots - to extract the calculated sound levels from the program.

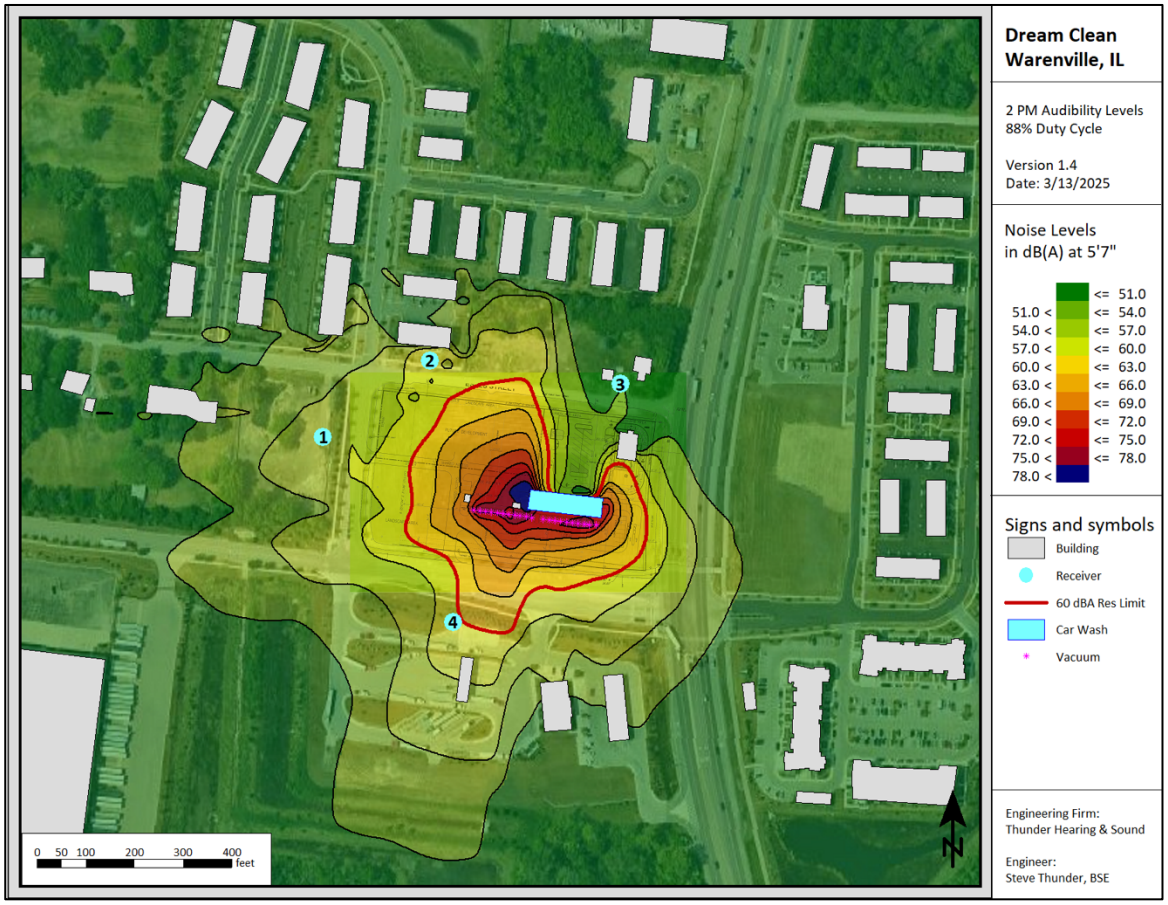


Figure 5 – Audibility level contours from 1:00 PM – 3:00 PM

As shown in **FIGURE 5**, we expect the noise levels from the Dream Clean facility to be above the ambient level for all four points at 2:00 PM. However, impact is determined by how much the noise is above the ambient at a given time. For example, a level 2 dB above the ambient would not be perceptible and would be considered no impact (see **TABLE 1**). A full table of levels for each location and each hour is attached at the end of this report.

While **FIGURE 5** shows the 2-dimensional radiation of sound from the site, we also prepared a time-series graph showing the hourly time-averaged level of the projected sound levels compared with the hourly ambient levels at location #2 (3S515 Barkley Ave). In **FIGURE 6**, the green area is the measured ambient noise level for the area; the blue bars are the projected sound levels from the car wash at location #2; and the red dashed line is the Warrenville noise limit (see the *Applicable Noise Regulations* section above).

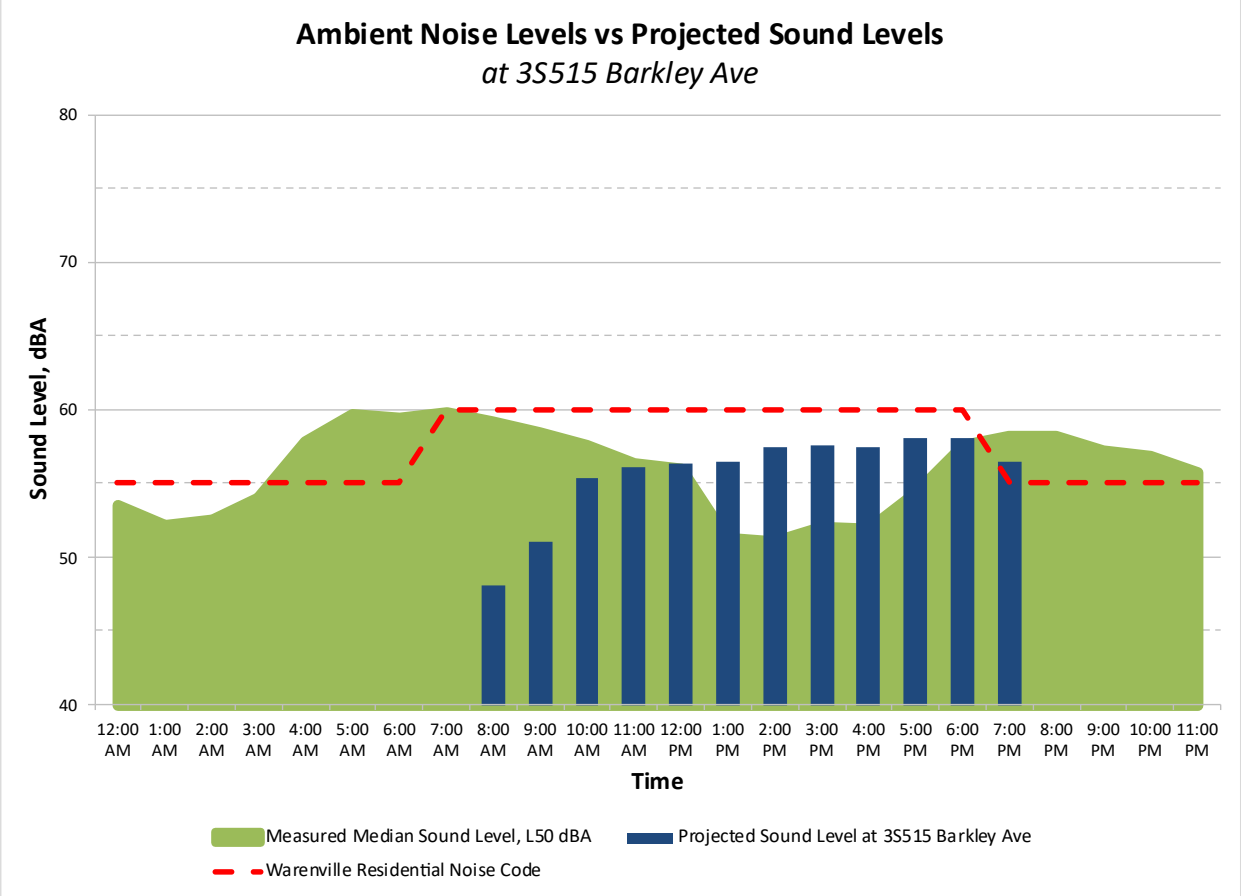


Figure 6 – Hourly sound levels for the existing ambient noise (green area) compared with the hourly sound levels generated by Dream Clean Car Wash at location #2 (blue bars)

When interpreting **FIGURE 6**, the projected hourly sound levels generated by the Dream Clean facility (shown by the bars) should be compared against 1) the red-dashed line showing the Warrenville daytime and nighttime noise limits of 60 and 55 dBA, respectively, and 2) the green area showing the ambient noise.

As seen in **FIGURE 6,** the Dream Clean noise (blue bars) is below the Warrenville noise limit (red-dashed line) through the 6:00 PM hour. Accordingly, the noise from this facility would **meet the Warrenville noise code** until about 7:00 PM. After 7:00 PM the limit drops by 5 dB, but that ambient noise is higher than the limit. When this occurs, the ambient noise becomes the defacto limit. This is because it would not be possible to have a valid measurement of the car wash noise when the ambient noise is higher than the car wash noise. Additionally, because the noise would not exceed the ambient noise, there would be no impact. In other words, noise that is hardly audible poses no adverse effect, and would meet the intent of the noise code.

Despite meeting the Village code, some impact may occur at location #2 (3S515 Barkley Ave) in the afternoon hours. Although unusual, the noise at this location appears to be the lowest in the 1:00-5:00 PM timeframe. Typically, the lowest ambient noise is during the middle of the night because that's when traffic is the lowest. Therefore, it's likely the midday ambient noise is normally higher. This makes our analysis that, shows a mild impact in the afternoon, conservative. We also note that when the southeast corner of Barkley Ave and Estes St is developed, the buildings would act as barriers and reduce any impact.

Conclusion

Our comprehensive study of the noise radiated from the proposed Dream Clean facility has yielded insightful findings. Based on the measurement of sound generated by noise sources at a similar facility, the use of a sophisticated sound modeling program, the assessment of the existing ambient noise levels, and the measurement methodology stipulated by the State of Illinois, we have determined that:

1. The Dream Clean Car Wash will not exceed the Warrenville residential noise code limits.

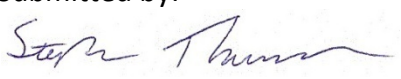
2. The Dream Clean Car Wash will not exceed the Warrenville business noise code limits.

3. The projected noise levels are generally lower than the existing ambient noise, indicating minimal impact, especially during the morning and evening commutes.

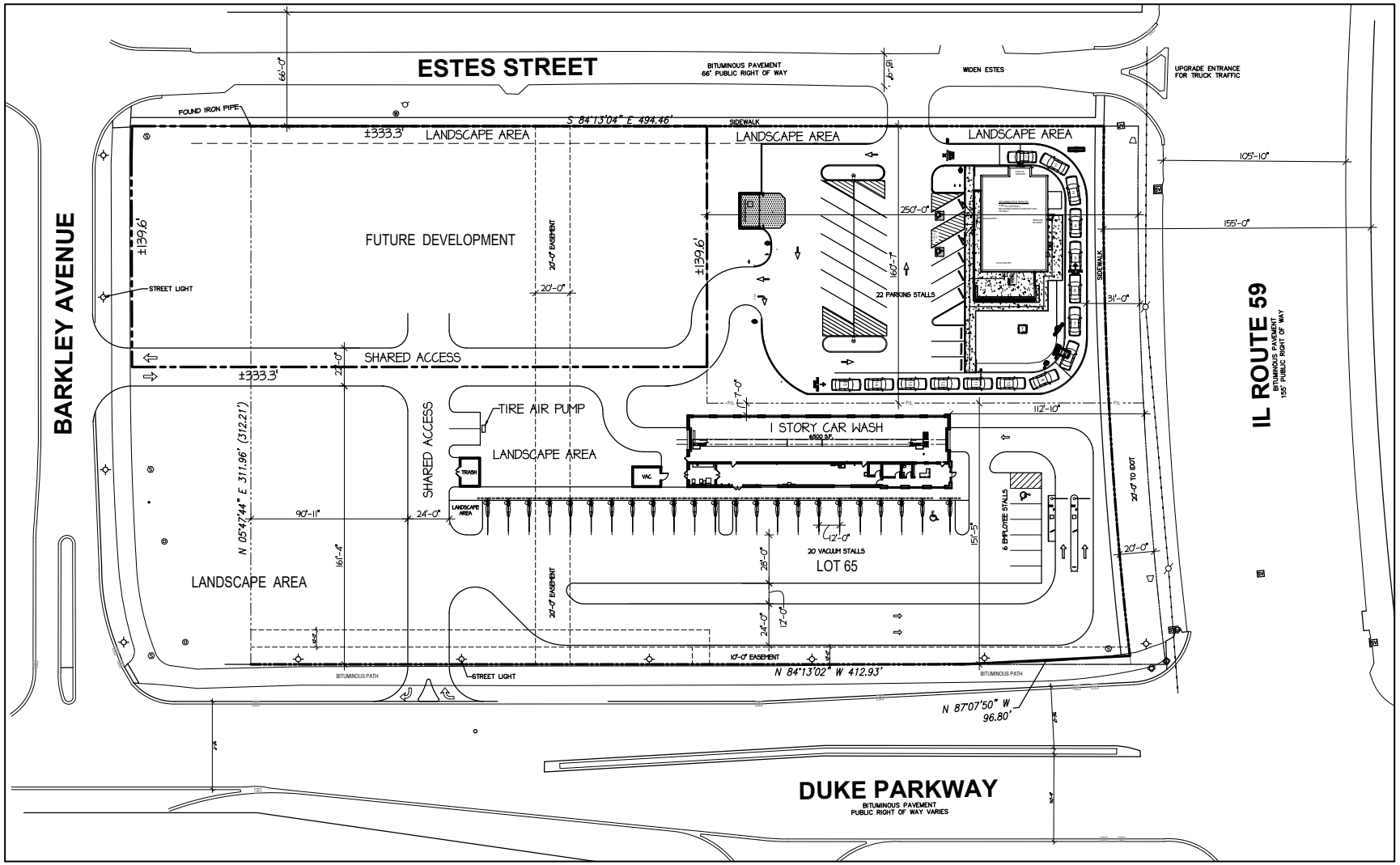
4. A small increase in noise (mild impact) is possible from 1:00-5:00 PM at 3S515 Barkley Ave, but this will be mitigated when future buildings are constructed in the area.

This is not to say that the noise will be inaudible at all times. For example, when a car wash occurs at the same time as a lull in traffic, that car wash would likely be audible. But as the US EPA advocates, to assess the long-term annoyance of a noise source, logarithmic time-averaging must be used in the analysis. Consistent with the requirements in the State of Illinois noise code, we used a one-hour time reference in our analysis.

Submitted by:



Steve Thunder, BSE
Acoustical Engineer



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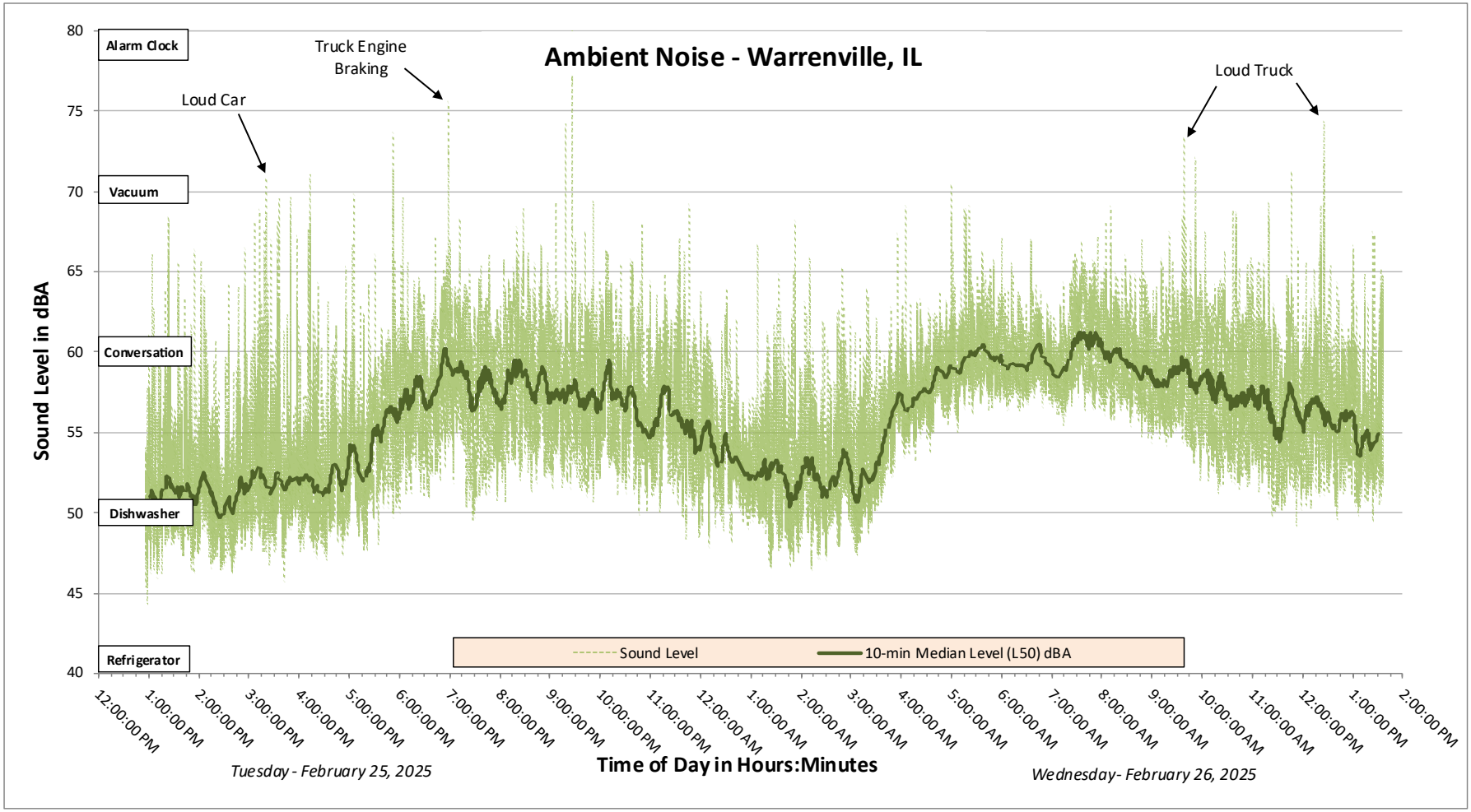

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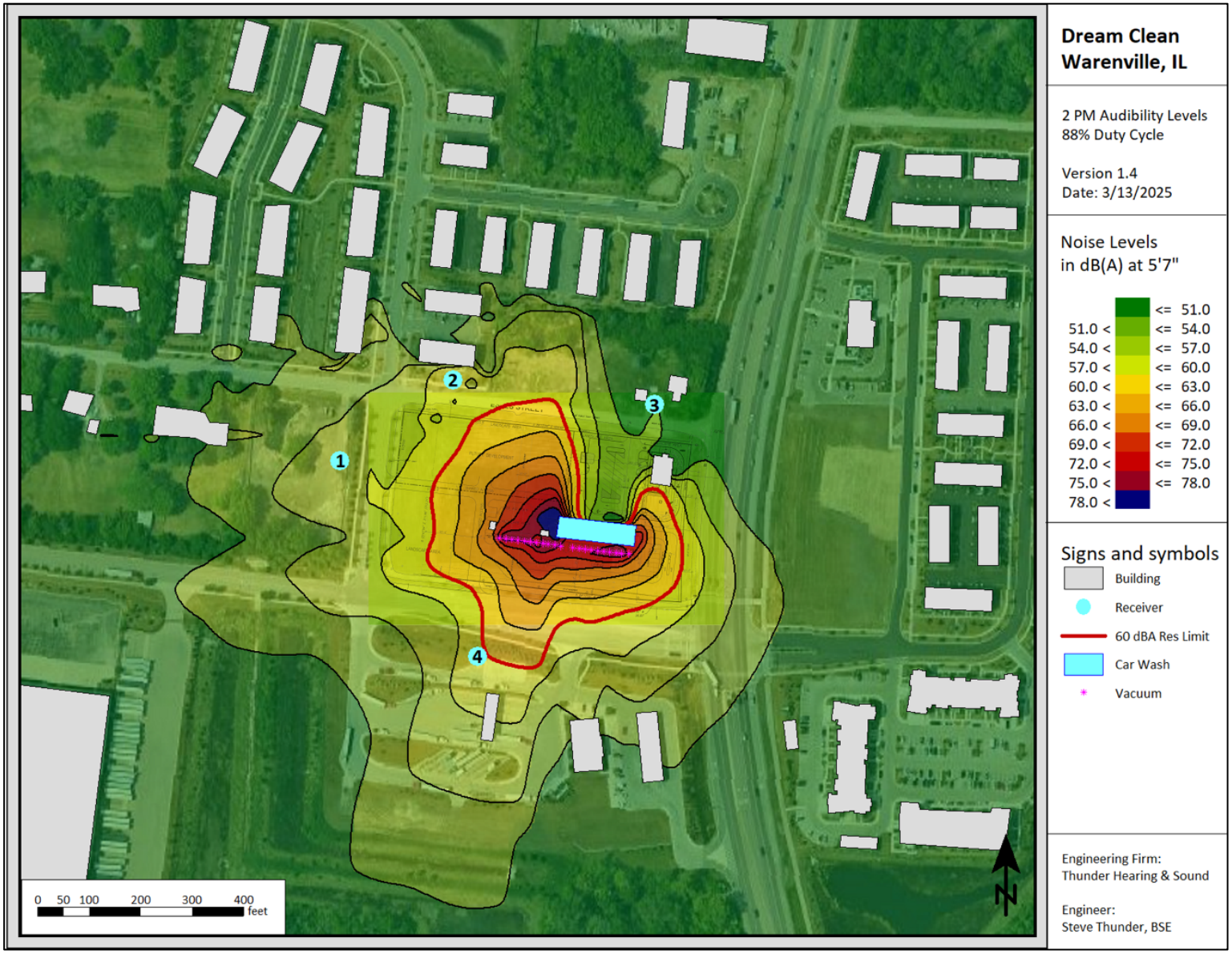

Figure 5 – Audibility level contours from 1:00 PM – 3:00 PM

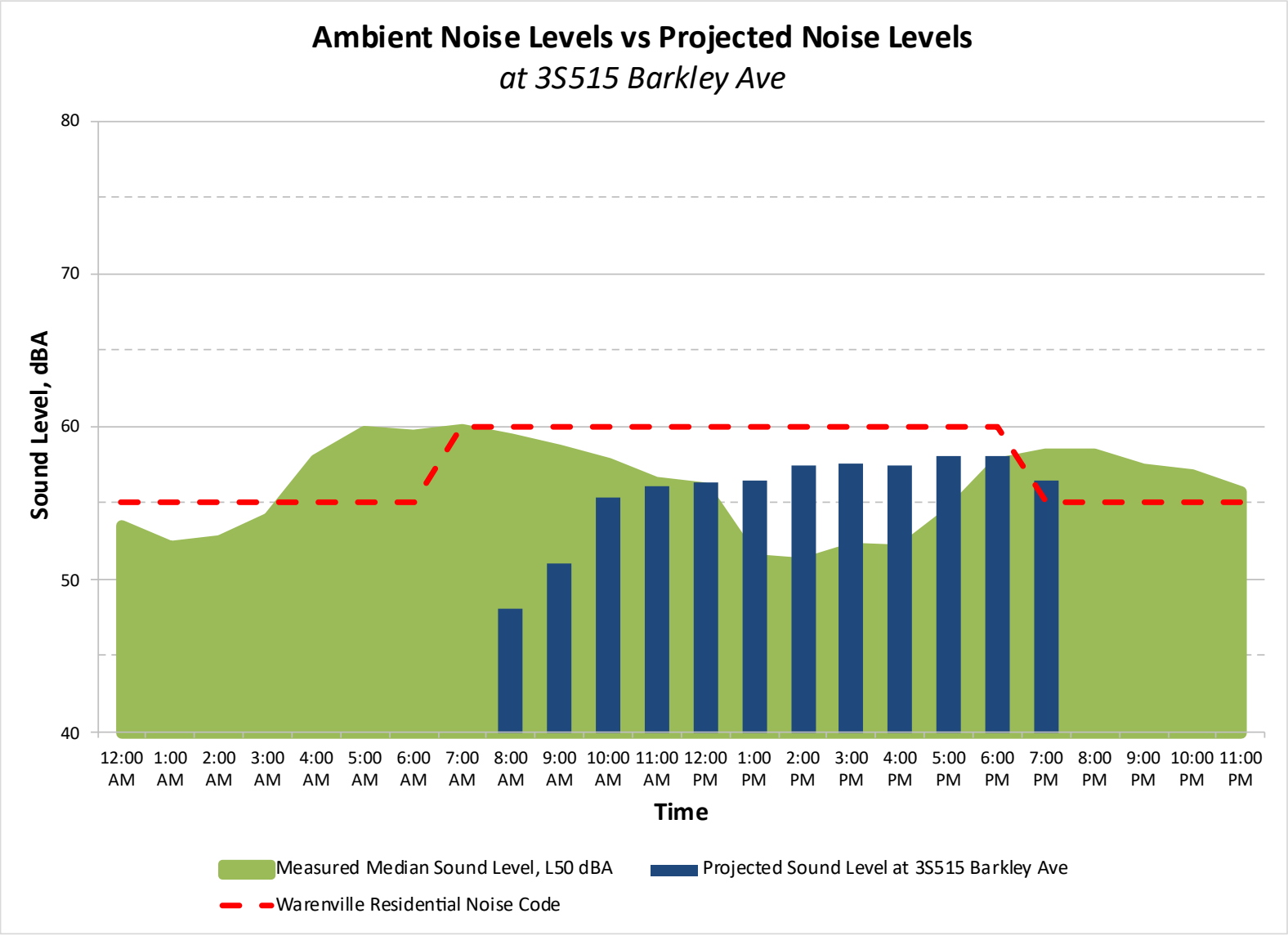

Figure 6 – Hourly sound levels for the existing ambient noise (green area) compared with the hourly sound levels generated by Dream Clean Car Wash at location #2 (blue bars)

Receiver	Obj.-No.		7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM		Daytime Limit	Nighttime Limit (7pm - 7am)
30W121 Estes St	1			47	50	54	55	55	55	56	56	56	57	57	55			60	55
3S515 Barkley Ave	2			48	51	55	56	56	57	58	58	57	58	58	57			60	55
30W020 Estes St	3			41	44	49	49	50	50	51	51	51	51	51	50			60	55
Thorntons	4			50	53	58	58	59	59	60	60	60	60	60	59			67	62
Ambient Noise			60	59	58	58	56	56	51	51	52	52	54	58	58	58			
			All values in dBA																