

September 14, 2022

Mr. Jim Waterman, Executive Vice President
Garnett Reynolds Holdings, LLC
223 Highland Road
Rye, NY 10580

Re: *Peer Review of Sound Study of Washville Carwash, Cranston, RI*

Ref: 4736

Dear Mr. Waterman:

Tech Environmental, Inc. (Tech) is pleased to provide this response to the comments of our “Sound Study of Washville Carwash, Cranston, RI” dated March 4, 2022. Those comments were emailed to me, City of Cranston staff Douglas McLean and Kristen Schawalder of Sevan Solutions on September 2, 2022, by Mr. Michael Bahtiarian of Acentech and included requests for additional information and an evaluation of the inlets associated with the vacuum stations (i.e., the business end). Tech understands the comments provided by Acentech and has revised our Sound Study to address each of them. Attached is a revised Sound Study of Washville Carwash, Cranston, RI. Furthermore, Tech is providing responses below to address each of the comments provided by Acentech.

1. Mr. Bahtiarian requested a specification/data sheet showing the basis for the vacuum blower units. The revised Sound Study includes literature from the car wash vacuum manufacturer that provides the basis for the sound levels assumed in the modeling contained in the revised Sound Study. Please note that this information was provided after the submission of the Sound Study dated March 4, 2022 and represents a vacuum unit that is quieter than the vacuum unit previously assumed in the modeling. The revised Sound Study incorporates the latest information which is included in the revised Sound Study as Appendix B.
2. Mr. Bahtiarian requested the assumed heights of the blower equipment/air outlet. The Sound Study assumed that the vacuum blower units were four (4) feet (1.2 meters) above grade. This assumption has been noted in the revised Sound Study.
3. Mr. Bahtiarian requested further details regarding the methodology used for modeling the vacuum blower units located in enclosures, and specifically the sound power assumed for the enclosure door and an explanation of how that was determined. The revised Sound Study does not include the vacuum station enclosures in the modeling, but rather uses the more recent literature from the car wash vacuum manufacturer (see Appendix B), which includes the effects of an enclosure. Thus, we believe that Mr. Bahtiarian’s request for details regarding the modeling of the enclosures is now moot.
4. Mr. Bahtiarian commented that the proposed car wash should use a good sound rated door instead of modeling a leak in the enclosure wall. As discussed above, the revised Sound Study does not include the vacuum station enclosures in the modeling, but rather uses the more recent literature from the car wash vacuum manufacturer (see Appendix B), which includes the effects of an enclosure. Thus, we believe that Mr. Bahtiarian’s comment regarding a good sound rated door is now moot.

5. Mr. Bahtiarian commented that the previous Sound Study did not include an evaluation of the inlets associated with the vacuum station (i.e., the business end). Mr. Bahtiarian's comment was accurate, and the revised Sound Study includes an evaluation of twenty-two (22) vacuum inlets in the self-service area of the proposed carwash.

I am hopeful that these responses to comments in the revised Sound Study will provide the City of Cranston justification that the Sound Study is now complete, and the proposed carwash will comply with the City of Cranston Code of Ordinances, Title 8, Chapter 8.20 Noise Control.

If you have any questions, please call me at 781-890-2220.

Sincerely,

TECH ENVIRONMENTAL, INC.



Marc C. Wallace, QEP, INCE
Vice President

September 14, 2022

Mr. Jim Waterman, Executive Vice President
Garnett Reynolds Holdings, LLC
223 Highland Road
Rye, NY 10580

Re: *Sound Study of Washville Carwash, Cranston, RI*

Ref: 4736

Dear Mr. Waterman:

Tech Environmental, Inc. (Tech) is pleased to provide this letter report summarizing the results of an acoustic modeling study of the proposed Washville Carwash at 1300-1310 Oaklawn Avenue in Cranston, Rhode Island. The goal of this work was to demonstrate that the proposed carwash will comply with the City of Cranston Code of Ordinances, Title 8, Chapter 8.20 Noise Control (Cranston Noise Code).

This letter report summarizes the modeling analyses performed for this study. Section 1.0 provides an introduction to the common measures of environmental sound. Section 2.0 presents the applicable noise regulations and design goals, and Section 3.0 presents the acoustic modeling approach and results. The study concludes that the proposed carwash will generate sound level impacts that fully comply with the City of Cranston Noise Code.

1.0 Common Measures of Environmental Sound

Noise is defined as "unwanted sound", which implies sound pressure levels that are annoying or disrupt activities that people are engaged in. The human sense of hearing is subjective and highly variable between individuals. Noise regulations and guidelines set quantitative limits to the sound pressure level (measured with sound analyzers and predicted with computer models) in order to protect people from sound exposures that most would judge to be annoying or disruptive.

The loudness of a sound is dependent on the radiated energy of the sound source and the propagation and attenuation characteristics of the air. The standard unit of sound pressure level (L_p) is the decibel (dB). A property of the decibel scale is that the sound pressure levels of two separate sounds are not directly additive. For example, if a sound of 40 dB is added to another sound of 40 dB, the total is only a 3 dB increase, not a doubling to 80 dB. For broadband sounds, a 3 dB change is the minimum change perceptible to the human ear. Table 1 presents the perceived change in loudness of different changes in sound pressure levels.

TABLE 1
SUBJECTIVE EFFECT OF CHANGES IN SOUND PRESSURE LEVELS

Change in Sound Pressure Level	Perceived Change in Loudness
3 dB	Just perceptible
5 dB	Noticeable
10 dB	Twice (or half) as loud

The acoustic environment in a suburban commercial/residential area, such as that surrounding 1300-1310 Oaklawn Avenue in Cranston, primarily results from motor vehicle traffic on Interstate I-295 and local roadways. Typical sound levels associated with various activities and environments are presented in Table 2.¹

TABLE 2
COMMON SOUND LEVELS

Sound Level (dBA)	Common Indoor Sounds	Common Outdoor Sounds
110	Rock Band	Jet Takeoff at 1000'
100	Inside NYC Subway Train	Chain Saw at 3'
90	Food Blender at 3'	Impact Hammer (Hoe Ram) at 50'
80	Garbage Disposal at 3'	Diesel Truck at 100'
70	Vacuum Cleaner at 10'	Lawn Mower at 100'
60	Normal Speech at 3'	Auto (40 mph) at 100'
50	Dishwasher in Next Room	Busy Suburban Area at night
40	Empty Conference Room	Quiet Suburban Area at night
25	Empty Concert Hall	Rural Area at night

¹ U.S. DOT, FHWA, Noise Fundamentals Training Document, Highway Noise Fundamentals, September, 1980.

2.0 Noise Regulations

This section presents the noise regulations applicable to the proposed carwash.

2.1 State of Rhode Island

The State of Rhode Island does not have applicable quantitative noise regulations.

2.2 City of Cranston Noise Code

The City of Cranston Code of Ordinances regulates noise under Chapter 8.20 Noise Control. Chapter 8.20(F)(1) states that, “It shall be unlawful for any person to emit or cause to be emitted any noise which leaves the premises on which it originates, crosses a property line, and enters onto any other premises in excess of the sound pressure levels during the time periods presented in Table A”. A copy of Table A is presented below.

**TABLE A
CITY OF CRANSTON CODE OF ORDINANCES, TITLE 8, CHAPTER 8.20
MAXIMUM ALLOWABLE NOISE SOUND PRESSURE LEVELS FOR SPECIFIC PREMISES**

<i>Type of Premises</i>	<i>Location Where Noise is Measured</i>	<i>Time Period</i>	<i>Maximum Allowable Sound Pressure Level</i>
<i>Residential premises</i>	<i>Property line</i>	<i>7:00 a.m. to 10:00 p.m.</i>	<i>55 dB(A)</i>
<i>Residential premises</i>	<i>Property line</i>	<i>10:00 p.m. to 7:00 a.m.</i>	<i>50 dB(A)</i>
<i>Commercial premises</i>	<i>Property line</i>	<i>7:00 a.m. to 10:00 p.m.</i>	<i>65 dB(A)</i>
<i>Commercial premises</i>	<i>Property line</i>	<i>10:00 p.m. to 7:00 a.m.</i>	<i>60 dB(A)</i>
<i>Industrial premises</i>	<i>Property line</i>	<i>7:00 a.m. to 10:00 p.m.</i>	<i>80 dB(A)</i>
<i>Industrial premises</i>	<i>Property line</i>	<i>10:00 p.m. to 7:00 a.m.</i>	<i>75 dB(A)</i>
<i>Public premises</i>	<i>Property line or anywhere on public premises</i>	<i>7:00 a.m. to 10:00 p.m.</i>	<i>75 dB(A)</i>
<i>Public premises</i>	<i>Property line or anywhere on public premises</i>	<i>10:00 p.m. to 7:00 a.m.</i>	<i>70 dB(A)</i>

The Cranston Noise Code defines "residential premises" as, “single or multiple dwelling units,” defines “commercial premises" as, “any premises where offices, clinics, kennels, shopping and service establishments exist,” and defines “public premises” as those, “owned or controlled by any public governmental entity and shall include streets, alleys, parks and waterways.”

2.3 Design Goals

It is our understanding that 1300-1310 Oaklawn Avenue is bordered to the east by residential premises, to the north by residential and commercial premises, and to the west and south by public premises (i.e., Oaklawn Avenue and Bateman Avenue). It also our understanding that the proposed carwash would not operate after 10:00 p.m., or before 7:00 a.m. Table 3 presents the premises bordering the proposed carwash and the applicable sound limit at each location as prescribed by the Cranston Noise Code. The property line locations are illustrated in Figure 1.

**TABLE 3
DESIGN GOALS FOR THE WASHVILLE CARWASH**

ID	Property Line	Direction	Type of Premises	Cranston Noise Code Limit
1	245 Bateman Avenue	East	Residential	55 dBA
2	320 Mayfield Avenue	North	Residential	55 dBA
3	326 Mayfield Avenue	North	Residential	55 dBA
4	1312 Oaklawn Avenue	North	Commercial	65 dBA
5	West Property Line	West	Public	75 dBA
6	South Property Line	South	Public	75 dBA

3.0 Modeling Assumptions and Results

This section describes the modeling approach and assumptions included in our acoustic modeling analysis and predicted sound levels at the nearest property lines to the proposed carwash.

3.1 Modeling Assumptions

Future sound levels of the proposed carwash were calculated with the CadnaA acoustic model. The assumptions in our acoustic modeling analysis are as follows:

1. The location of the proposed carwash was based on site plans by Sevan Engineering.² The plans show the proposed location of the carwash in the center of two (2) contiguous parcels, with the carwash entrance on the east side of the building, the carwash exit on the west side of the building, two (2) vacuum stations in the northwest portion of the on the parcels, and twenty-two (22) vacuum user stations/inlets in the self-service area to the north of the proposed carwash building.
2. The primary sources of sound associated with the carwash is the mechanical equipment inside of the building, primarily the dryer blowers, which emit sound from the carwash’s entrance and exit,

² Concept Site Plan, Option 2, Washville Carwash, 1300-1310 Oaklawn Ave., Cranston, RI 02920, Sevan Engineering, Revised January 24, 2022.

the two (2) vacuum stations, and the twenty-two (22) vacuum user stations/inlets. The sound power levels for the sources, including octave bands, utilized in the acoustic model are included in the attached Appendix A.

3. The carwash is proposing to install enclosures around the two (2) vacuum stations to mitigate the sound of the two (2) vacuum blowers within each enclosure. This analysis assumes that each of the vacuum blower units is four (4) feet (1.2 meters) above grade. The location of the vacuum blowers are illustrated in Figure 1.
4. The carwash is proposing twenty-two (22) vacuum station inlets (i.e., the business end) in the self-service area of the proposed car wash. This analysis assumes that each of the vacuum inlets is five (5) feet (1.5 meters) above grade. The location of the vacuum inlets are illustrated in Figure 1.
5. The proposed carwash will not operate after 10:00 p.m. or before 7:00 a.m.

3.2 *Future Sound Levels*

CadnaA is a sophisticated 3-D model for sound propagation and attenuation based on International Standard ISO 9613.³ Absorption of sound assumed standard conditions and is significant at large distances and at high frequencies. ISO 9613 was used to calculate propagation and attenuation of sound energy by hemispherical divergence with distance, surface reflection, ground, and shielding effects by barriers, buildings, and ground topography.

The predicted maximum sound levels are conservative because:

1. The model assumes a ground-based temperature inversion, such as may occur on a clear, calm night when sound propagation is at a maximum. This worst-case condition is infrequent.
2. The model assumes that all sound sources are operating simultaneously (a worst-case condition not likely to occur).

Sound levels were predicted for the simultaneous operation of the carwash operation, both vacuum stations and all twenty-two (22) vacuum inlets. The locations of the sound sources are illustrated in Figure 1. Table 4 summarizes the modeling results that the carwash would result in sound level impacts that range from 45 dBA to 72 dBA at the nearest property lines. The predicted sound level impacts of the carwash comply with the facility design goals for each location (see Section 2.3). The sound level impacts of the carwash at locations further away would be even less. Table 4 confirms that the proposed carwash will fully comply with the City of Cranston Noise Code.

³ International Standard, ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors, -- Part 2 General Method of Calculation.

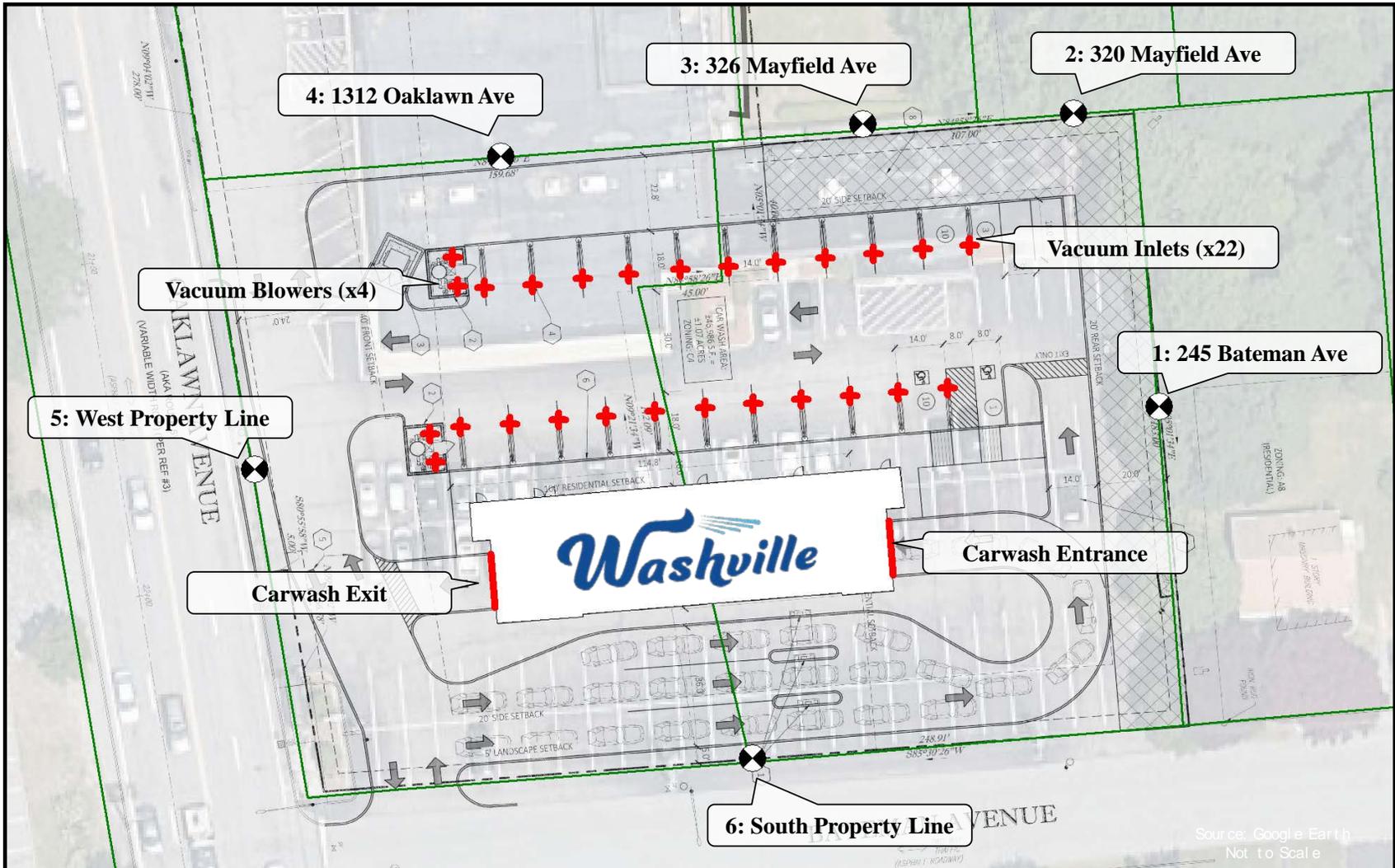


Figure 1

Modeled Property Line Locations and Sound Sources
Washville Carwash, 1300-1310 Oaklawn Avenue, Cranston, RI



TABLE 4

PREDICTED SOUND LEVELS FROM THE WASHVILLE CARWASH

ID	Property Line	Cranston Noise Code Limit	Predicted Sound Level	Carwash Complies?
1	245 Bateman Avenue	55 dBA	45 dBA	Yes
2	320 Mayfield Avenue	55 dBA	46 dBA	Yes
3	326 Mayfield Avenue	55 dBA	50 dBA	Yes
4	1312 Oaklawn Avenue	65 dBA	54 dBA	Yes
5	West Property Line	75 dBA	72 dBA	Yes
6	South Property Line	75 dBA	49 dBA	Yes

In conclusion, the proposed carwash will comply with the City of Cranston Noise Code.

If you have any questions, please call me at 781-890-2220.

Sincerely,

TECH ENVIRONMENTAL, INC.



Marc C. Wallace, QEP, INCE
Vice President

4736/Sound Study for Washville Cranston 9-14-22

APPENDIX A – REFERENCE SOUND POWER LEVELS (L_w, dB)

Sound Source	31 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1K Hz	2K Hz	4K Hz	8K Hz	Total (dBA)
Carwash Entrance	54	58	57	55	57	59	58	54	45	63
Carwash Exit	98	102	101	99	101	103	102	97	89	107
Vacuum Blower Units ⁴	89	86	85	81	76	74	70	66	59	79
Vacuum Blower Inlets ⁵	82	79	78	74	69	67	63	59	52	72

⁴ The carwash is proposing two (2) vacuum stations, with each having two (2) vacuum blowers for a total of four (4) vacuum blower units. Each vacuum blower unit is assumed to emit 79 dBA per the manufacturer’s literature contained herein as Appendix B.

⁵ The carwash is proposing twenty-two (22) vacuum station inlets (i.e., the business end) in the self-service area of the proposed car wash and this study assumes that each row of eleven (11) inlets are associated with two (2) vacuum blower units. Each vacuum inlet is assumed to emit 72 dBA, which is equivalent to the sum of two (2) vacuum blower units (82 dBA) divided by eleven (11) vacuum inlets per pair of vacuum blowers (i.e., minus 10 times the log of 11, or minus 10.4 dBA).

APPENDIX B – SPECIFICATION/DATA SHEET FOR VACUUM BLOWER UNITS



Project Name: **MOD Wash Facility**

Site Address: **501 Northpointe Circle, Seven Fields, PA**

SOUND LEVEL METER READINGS

MODEL: FT-DD-T450HP4 (50HP T4 TURBINE DIRECT DRIVE VACUUM PRODUCER) **WITH EXHAUST SILENCER**

READING ONE: 68 DB-A, 3 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING TWO: 61 DB-A, 10 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING THREE: 53 DB-A, 20 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE.

READING FOUR: 32 DB-A, 30 FEET FROM TURBINE @ 45° ANGLE
AND NO BACKGROUND NOISE OR OUTSIDE INTERFERENCE

READINGS WERE TAKEN OUTSIDE OF A CMU ENCLOSURE WITH CONCRETE SLAB AND NO ROOF.

SOUND LEVEL METER USED:

SIMPSON MODEL #40003 – MSHA APPROVED.
MEETS OSHA & WALSH-HEALY REQUIREMENTS FOR NOISE CONTROL.
CONFORMS TO ANSI S1.4-1983, IEC 651 SPECS FOR METER TYPE

Vacutech
1350 Hi-Tech Drive, Sheridan WY, 82801
PHONE: (800) 917-9444 FAX: (303) 675-1988
EMAIL: info@vacutechllc.com
WEB SITE: www.vacutechllc.com