III. EXISTING CONDITIONS, IMPACTS AND MITIGATION

N. Noise

Costco Wholesale
Route 202/35
Town of Yorktown, New York

Noise Assessment Report

Prepared for

Retail Store Construction Company
500 Old Country Road
Garden City, New York
Tel: (516) 741-7400

Prepared by

TRC
1200 Wall Street West, 2nd Floor
Lyndhurst, NJ 07071

October 2011

TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

Table No. **Page**

LIST OF FIGURES

Figure No. **Page**

LIST OF APPENDICES

1.0 INTRODUCTION

TRC Environmental Corporation was contracted to prepare a noise assessment of the proposed Costco Wholesale Store (Project) on an 18.75 acre parcel situated in the northwest quadrant of the intersection of the Taconic State Parkway and US Route 202 / NYS Route 35, in the Town of Yorktown, New York. The Project is proposed to include the Wholesale Warehouse, a four bay loading dock, a tire center with four service bays, and a fueling facility with six double fueling dispensers. The assessment consisted of an ambient noise measurement program, conducted at nearby residential and other noise sensitive locations, and a noise modeling and impact assessment. Ambient noise measurements were conducted during the daytime hours of September 14, 2011 and nighttime hours of September 13, 2011. The noise impact evaluation consisted of performing computer noise modeling of the major noise producing equipment for the proposed Costco facility, which included facility HVAC units, truck delivery traffic and vehicular traffic noise. Modeled sound levels were assessed against existing ambient levels. This report presents a summary of the analysis and findings.

2.0 GENERAL INFORMATION ON NOISE

Noise is defined as unwanted sound. The range of pressures that cause the vibrations that create noise is large. Noise is therefore measured on a logarithmic scale, expressed in decibels (dB). The frequency of a sound is the "pitch." The unit for frequency is hertz (Hz). Most sounds are composed of a composite of frequencies. The normal human ear can usually distinguish frequencies from 20 Hz (low frequency) to about 20,000 Hz (high frequency), although people are most sensitive to frequencies between 500 and 4000 Hz. The individual frequency bands can be combined into one overall dB level.

Noise is typically measured on the A-weighted scale (dBA). The A-weighting scale was developed and has been shown to provide a good correlation with the human response to sound and is the most widely used descriptor for community noise assessments (Harris, 1991). The faintest sound that can be heard by a healthy ear is about 0 dBA, while an uncomfortably loud sound is about 120 dBA. In order to provide a frame of reference, some common sound levels are listed below.

- Pile Driver at 100 feet 90 to 100 dBA
- Chainsaw at 30 feet 90 dBA
- Truck at 100 feet 85 dBA
- Noisy Urban Environment 75 dBA

- Lawn Mower at 100 feet 65 dBA
- Average Speech 60 dBA
- Typical Suburban Daytime 50 dBA
- Quiet Office 40 dBA
- Quiet Suburban nighttime 35 dBA
- Soft Whisper at 15 feet 30 dBA

Common terms used in this noise analysis are defined below.

L_{eq} – The equivalent noise level over a specified period of time (i.e., 1-hour). It is a single value of sound that includes all of the varying sound energy in a given duration.

3.0 EXISTING CONDITIONS

The area surrounding the proposed facility consists of a mix of residential and commercial land uses. The most proximate residential uses include a few residences on Old Crompond Road to the southwest, residences on Deer Track Court and Winding Court to the northwest and north, a residential development on Park Lane to the south, and a residential neighborhood across the Taconic Parkway to the east. A shopping center is located southwest of the proposed site. Other commercial uses are also located in the area.

A total of nine noise monitoring locations were selected in order to characterize and quantify the existing noise environment in the area. Nighttime noise monitoring was conducted at five of the nine locations that are proximate to the site, in order that potential impacts due to Project operation could be evaluated. Measurements were conducted at all nine locations during the day. The daytime data were collected in order to assess potential construction related impacts. The four daytime only measurement locations included non-residential noise sensitive uses, located somewhat further from the Project site. The nine noise monitoring locations included the following.

- Winding Court
- Deer Track Court
- Fox Meadow Court
- Old Crompond Road
- Park Lane
- Crompond Elementary School (daytime only)
- Roces Alternative High School (daytime only)
- First Presbyterian Church of Yorktown (daytime only)
- Yorktown Jewish Center (daytime only)

The monitoring locations are further identified on Figure 1.

Short-term monitoring (15 minutes in duration at each location) was conducted during the daytime and nighttime hours. Monitoring was conducted with a RION NA-27 precision Type 1 octave band analyzer. The microphone was fitted with a windscreen to reduce wind generated noise and mounted on a tripod at a height of approximately five feet above the ground. The instrument was configured to measure and store the L_{eq} one-third octave band levels.

Meteorological conditions during the daytime measurements consisted of sunny to mostly cloudy skies with light south winds of about five miles per hour or less. The temperatures ranged from 79 degrees F to 86 degrees F. During the nighttime measurements, skies were clear and winds were calm. The temperature was between 68 degrees F and 72 degrees F.

Existing noise sources during the day consisted mainly of vehicular traffic sounds from the Taconic State Parkway, Route 35/Crompond Road, local roads, and insect noise. Other natural sounds (birds, rustling vegetation) were also present. Noise sources at night include the same vehicular traffic sources as during the day and significant insect sound.

Insect noise is common during warm weather months, and in a setting such as the Project area, and can contribute significantly to total ambient sound levels. Insect noise is concentrated in the higher frequencies of the sound spectrum, and is easily recognizable upon reviewing the spectral shape of the measured data. It is therefore possible to remove the insect noise contribution from the measured sound levels, in order to provide a more conservative measure of the existing noise environment (e.g., that which might occur during cold weather months when insect noise is not present).

A summary of the overall A-weighted L_{eq} data collected during the noise monitoring program is presented in Table 1 below. Sound level meter certification sheets are provided in Appendix A.

Table 1: Measured Ambient Noise Levels (dBA)

Location	Daytime L_{eq}		Nighttime L_{eq}	
	With Insect Noise	Without Insect Noise	With Insect Noise	Without Insect Noise
Winding Court	47	47	56	46
Deer Track Court	44	44	57	43
Fox Meadow Court	49	49	55	46
Old Crompond Road	53	53	57	47
Park Lane*	45	44	54	45
Crompond Elementary School	54	53	---	---
Roces Alternative High School	46	45	---	---
First Presbyterian Church of Yorktown	55	55	---	---
Yorktown Jewish Center	60	60	---	---

*Data collected at this location were also utilized to represent ambient conditions at the few residences just north of this location on Carpenter Road.

A review of the above data reveals the significant contribution of insect noise during the nighttime hours. Nighttime sound levels are between nine and 14 dBA lower when the contribution of insect noise is removed. A further review reveals that insect noise is a minor contributor to daytime levels, as the difference after insect noise was removed is one dBA or less.

Nighttime noise levels are, for the most part, very similar to daytime noise levels when insect noise is removed. It is not unusual in this type of setting for the lower level of activity at night, and associated lower noise level, to be offset by the more favorable noise propagation conditions, and therefore greater sound level, of nearby sources; in this case particularly from the Taconic Parkway. Sound travels much more effectively at night than it does during warm, sunny days with light winds. Vehicular traffic sound from the Taconic State Parkway was more noticeable at night than during the day.

Ambient noise levels (without insects) during the day varied greatly between 44 dBA up to 60 dBA. The higher noise levels were measured at locations along major roadways (First Presbyterian Church, Jewish Center), where vehicular traffic noise dominated the noise

environment. Nighttime noise levels at the residential locations proximate to the facility were very similar, ranging from 43 dBA to 47 dBA.

The ambient sound levels discussed in subsequent sections of this report are those with insect noise removed.

4.0 TOWN OF YORKTOWN NOISE ORDINANCE

The Town of Yorktown has a "nuisance" type of noise ordinance in their Town Code (Chapter 216-2) which prohibits loud and unreasonable sounds such as radios and television sets which disturb the peace and quiet of neighboring residents, unnecessary horns and signaling devices on automobiles, yelling and shouting, and un-muffled exhausts of internal combustion engines. Other unreasonable sounds are also enumerated. The ordinance does not place numerical limits on any noise generating sources associated with the Project. Construction activity and related noise is regulated by Chapter 216-2 of the Town of Yorktown Code. Construction generated noise is limited to the hours of 7:00 a.m. to 11:00 p.m. on Monday through Thursday, 7:00 a.m. to 10:00 p.m. on Friday, 8:00 a.m. to 10:00 p.m. on Saturday and 8 a.m. to 11 p.m. on Sunday.

5.0 NOISE IMPACT CRITERIA

The NYSDEC has a program guidance document entitled *Assessing and Mitigating Noise Impacts* (NYSDEC 2000). This guidance, which is premised on state statutory authority, has been utilized as a standard for evaluating potential noise impacts from numerous projects throughout New York. The NYSDEC guidance recommends that for non-industrial settings, the SPL (Sound Pressure Level) due to a permanent source should probably not exceed ambient noise levels by more than 6 dBA at a given receptor in order to avoid noise impacts. The addition of any noise source, in a non-industrial setting, should not raise the total future ambient noise level above a maximum of 65 dBA.

The NYSDEC guidance explicitly states that the 6 dBA increase is to be used as a general guideline. There are other factors which should also be considered. For example, in settings with very low ambient sound levels, a greater increase may be acceptable since sound levels are so low.

6.0 NOISE MODELING ANALYSIS

6.1 Methodology

Computer noise modeling of the major facility sources was conducted utilizing the CadnaA noise model. This very powerful 3-dimensional model maps the noise contours of the overall project in accordance with a variety of standards, primarily VDI 2714 *Outdoor Sound Propagation* and ISO 9613. All sound propagation losses, such as geometric spreading, air absorption, ground absorption, and barrier shielding, can be calculated automatically in accordance with these recognized standards. Standard conditions of 50° F and 70 percent relative humidity were assumed. Modeling receptors were chosen in the same residential locations as where monitoring was performed, in order that direct comparison to existing noise levels could be made. Noise modeling was conducted for the two main sources associated with project operation: HVAC operation and truck delivery traffic.

The modeling analysis accounted for the proposed future grading plan and building features (e.g., rooftop parapet). Existing offsite topographic features were also included. Source heights and sound level data for the rooftop HVAC and refrigeration units were obtained from potential equipment vendors. Typical truck exhaust heights and sound levels were obtained from the literature. The model input and output files and source data sheets are provided in Appendix B.

6.2 Modeling Results and Mitigation Measures

<u>Rooftop HVAC and Refrigeration Units</u>

Numerous HVAC and refrigeration units will be located on the building roof. Detailed noise level data for the rooftop units were obtained from a potential vendor. The modeling conservatively assumed that all rooftop units would be operating simultaneously. Presented in Table 2 below are the modeled sound levels at all nearby residential areas with all HVAC units operating simultaneously, and compared to the measured existing ambient sound levels.

Table 2: Calculated HVAC Noise (dBA)

Location	Measured Nighttime	Calculated HVAC Noise	Combined Future Level	Increase Over Existing Condition
Winding Court	46	11	46	0
Deer Track Court	43	34	44	1
Fox Meadow Court	46	34	46	0
Old Crompond Road	47	39	48	1
Carpenter Road	45*	38	46	1

*Ambient data from Park Lane location

A review of these data reveals that noise levels generated by simultaneous operation of all the facility rooftop HVAC and refrigeration units will be below the existing ambient sound levels. Increases in total noise levels during nighttime hours would be one dBA or less, well below the NYSDEC noise impact criterion. Figure 2 displays the results as a noise contour map.

Delivery Trucks and Tire and Lube Express (TLE)

Delivery trucks will access the facility via the southern driveway entrance and utilize a dedicated road along the eastern side of the proposed building. This access route serves to shield residences to the north and west of the facility from truck related noise. The loading dock area will be located on the northeast end of the building. Heavy trucks traveling at 15 miles per hour through the property were assumed for the analysis. Delivery truck modeling was conducted by evaluating a truck at three discrete points within the facility. Each of these three points would be in line with residential locations, such that the highest expected sound level (e.g., without shielding from the building) was calculated. A fourth point was added that included two trucks idling at the loading dock. The highest calculated sound levels at each receptor location, for any truck position within the site, is provided in Table 3, along with the existing nighttime ambient noise level.

Table 3: Calculated Delivery Truck Noise (dBA)

Location	Measured Nighttime	Highest Calculated Delivery Truck Noise	Combined Future Level	Increase Over Existing Condition
Winding Court	46	20	46	0
Deer Track Court	43	38	44	1
Fox Meadow Court	46	44	48	2
Old Crompond Road	47	39	48	1
Carpenter Road	45*	43	47	2

*Ambient data from Park Lane location

The modeling results indicate that delivery truck sound levels at the nearest residences would be below existing nighttime ambient sound levels. Future increases in noise would be two dBA or less, which is well below the NYSDEC noise impact criterion. Further, these noise events will be brief, as it is estimated that about five trucks per night will access the facility. Further, observations made during the ambient noise monitoring program revealed noise levels generated by occasional loud cars and motorcycles on the Taconic Parkway and Route 35/Crompond Road at night generated much higher sound levels than the trucks would at the receptor locations.

Smaller delivery trucks and garbage trucks would also access the building via the southern driveway entrance. Additionally, some sound would be generated by the proposed Tire and Lube Express (TLE) at the facility. The delivery trucks at this location, because they would usually only be medium sized trucks or smaller, would generate lower sound levels than the large delivery trucks at the loading dock. These sound levels would also only occur during the day.

7.0 TRAFFIC NOISE ANALYSIS

A noise impact evaluation was performed by calculating expected noise level increases associated with traffic volumes. Traffic noise was evaluated by obtaining traffic count data for the No-Build and Build scenarios. Noise levels associated with vehicular traffic are a function mainly of traffic speed, vehicle mix (automobiles, medium trucks, heavy trucks) and volume.

Posted vehicle traffic speeds will not be affected by the project. Vehicle mixes are also anticipated to be essentially the same. Therefore, any changes in traffic related noise will be a function of the change in volume. For example, a doubling of traffic volume (assuming speeds and vehicle mixes do not change) equates to an increase in noise of 3 dBA.

Traffic volumes for each of the intersections evaluated for the traffic study, for each scenario, were tabulated and are presented in Table 4. The increase in noise over the No-Build scenario for each time period is also presented.

Table 4: Calculated Traffic Noise

Yorktown Costco Traffic Noise Analysis

Intersection	No-Build	Build	Sound Level Increase over
1 - NYS Route 35/US Route 22 and Lexington Avenue	**Traffic Volumes**		
AM Peak	2556	2568	**0.0**
PM Peak	2868	2964	**0.1**
Saturday Peak	2740	2897	**0.2**
2 - NYS Route 35/US Route 22 and Bear Mountain Parkway Extension			
AM Peak	2379	2392	**0.0**
PM Peak	2952	3048	**0.1**
Saturday Peak	2728	2883	**0.2**
3 - NYS Route 35/US Route 22 and Pine Grove Court			
AM Peak	2178	2193	**0.0**
PM Peak	2717	2823	**0.2**
Saturday Peak	2579	2750	**0.3**
4 - Bear Mountain Parkway Extension and Old Crompond Road			
AM Peak	944	945	**0.0**
PM Peak	1280	1288	**0.0**
Saturday Peak	888	903	**0.1**
5 - Old Crompond Road and Stoney Street			
AM Peak	382	383	**0.0**
PM Peak	752	761	**0.1**
Saturday Peak	626	640	**0.1**
6 - NYS Route 35/US Route 22 and Stoney Street			
AM Peak	2626	2641	**0.0**
PM Peak	3505	3620	**0.1**
Saturday Peak	3408	3595	**0.2**
7 - NYS Route 35/US Route 22 and Old Crompond Road			
AM Peak	2187	2203	**0.0**
PM Peak	2763	2878	**0.2**
Saturday Peak	2732	2919	**0.3**
8 - NYS Route 35/US Route 22 and Mohansic Avenue			
AM Peak	2269	2333	**0.1**
PM Peak	3025	3585	**0.7**
Saturday Peak	2933	3838	**1.2**

Intersection	No-Build	Build	Sound Level Increase over
9 - NYS Route 35/US Route 22 and Taconic State Parkway SB Ramp	**Traffic Volumes**		
AM Peak	2673	2720	**0.1**
PM Peak	3097	3457	**0.5**
Saturday Peak	3051	3633	**0.8**
10 - NYS Route 35/US Route 22 and Taconic State Parkway NB Ramp			
AM Peak	1958	1992	**0.1**
PM Peak	3153	3410	**0.3**
Saturday Peak	2741	3156	**0.6**
11 - NYS Route 35/US Route 22 and Strang Boulevard			
AM Peak	1757	1778	**0.1**
PM Peak	2244	2398	**0.3**
Saturday Peak	2154	2402	**0.5**
12 - NYS Route 35/US Route 22 and NYS Route 132			
AM Peak	1853	1873	**0.0**
PM Peak	2378	2522	**0.3**
Saturday Peak	2395	2629	**0.4**
13 - NYS Route 35/US Route 22 and Springhurst Street			
AM Peak	1939	1956	**0.0**
PM Peak	2288	2418	**0.2**
Saturday Peak	2291	2500	**0.4**
14 - NYS Route 35/US Route 22 and Granite Springs Road			
AM Peak	2366	2383	**0.0**
PM Peak	2530	2655	**0.2**
Saturday Peak	2527	2730	**0.3**
15 - NYS Route 35/US Route 22 and Baldwin Road			
AM Peak	1949	1963	**0.0**
PM Peak	2235	2331	**0.2**
Saturday Peak	2090	2245	**0.3**
16 - NYS Route 35/US Route 22/Commerce Street and NYS Route			
AM Peak	2587	2595	**0.0**
PM Peak	3045	3108	**0.1**
Saturday Peak	2956	3056	**0.1**

The data in Table 4 reveals that negligible increases over the no-build scenario will be experienced at any of the intersections due to increased vehicular traffic. The greatest calculated increase is only 1.2 dBA. All other increases are limited to less than 1 dBA, which is an essentially imperceptible increase. Using the NYSDEC impact criterion discussed previously, no significant adverse noise impacts would be expected from increased vehicular traffic associated with the project.

8.0 MITIGATION MEASURES – OPERATIONAL NOISE

The noise assessment revealed that sound levels due to Project operation, including HVAC, truck delivery, and from vehicular traffic, and the associated increases over existing conditions, would be well below the NYSDEC noise impact criterion. Further Project noise levels were also shown to be below existing ambient conditions. Accordingly, no significant noise impacts are expected, and no mitigation measures are deemed necessary.

9.0 CONSTRUCTION NOISE

The construction process for this Project will generally include the following phases:

- Ground Clearing
- Demolition
- Excavation
- Foundations
- Building Construction
- Restoration/Finishing

The construction process for commercial type projects generally occurs in the following sequences: ground clearing, demolition and excavation (road and infrastructure construction), foundations, building construction, exterior finishing and cleanup. Construction equipment utilized will differ from sequence to sequence. Construction equipment utilized differs in each phase, but in general, heavy equipment (bulldozers, loaders, dump trucks) is used during the excavation and demolition phases. Noise is generated during construction primarily from diesel engines that power the equipment. Exhaust noise is usually the predominant source of diesel engine noise, which is the reason that maintaining functional mufflers on all equipment will be a requirement of the Project.

Noise levels of construction equipment likely to be used for the Project are summarized in Table 5 (BBN, 1971; NYSDEC, 1974). Typical site average sound levels for each phase of construction are presented in Table 6 (BBN, 1971). Noise levels in the tables are presented for a reference distance of 50 feet. The nearest residence to the edge of the proposed Project building is approximately 500 feet away. Most residences and other noise sensitive areas are located much further from the project. Sound levels experienced at offsite locations will be much lower.

Table 5: Noise Levels of Major Construction Equipment

Equipment Type	Noise Level (dBA) At 50 Feet
Cement Trucks	85
Front Loaders	79
Graders	85
Bulldozers	85
Pickup Trucks	55
Backhoes	80
Concrete Mixers	85
Excavator	85

Sources (BBN, 1971; NYSDEC, 1974; MADEP)

Table 6: Typical Site Average Noise Levels by Construction Activity (dBA)

Construction Phase	Noise Level (dBA) at 50 Feet	
	Maximum Number of Equipment in Operation	Minimum Required Equipment in Operation
Ground Clearing	84	83
Demolition	89	83
Excavation	89	71
Foundations	77	77
Building Construction	84	72
Restoration/Finishing	89	74

Source (BBN, 1971)

The project site covers a fairly large area. The actual sound levels which will be experienced by existing off-site residential uses surrounding the site will be a function of distance, the equipment in operation at any given time, and the speed at which the equipment engines are operating. As such, there is no one single sound level that will occur during construction, and no one existing residential use will be exposed to the same sound levels over an extended period of time, as construction progresses through the site. For the purposes of this analysis, the construction

equipment was assumed to be located in the approximate center of the proposed building site in order to determine average construction noise levels.

The calculated levels were arrived at utilizing the same CadnaA noise model and assumptions utilized for calculating the HVAC noise levels. Calculated site average noise levels and the existing daytime ambient noise levels at each noise sensitive location are provided in Table 7 (maximum equipment) and Table 8 (minimum equipment).

Table 7: Calculated Site Average Construction Noise Levels – Maximum Equipment (dBA)

Receiver	Existing Daytime L_{eq}	Ground Clearing	Demolition	Excavation	Foundations	Building Assembly	Finishing
Winding Court	47	27	27	32	20	27	32
Deer Track Court	44	45	45	50	38	45	50
Fox Meadow Court	49	45	45	50	38	45	50
Old Crompond Road	53	52	52	57	45	52	57
Carpenter Road	44	53	53	58	45	53	58
Crompond Elementary School	53	16	16	21	9	16	21
Roces Alternative High School	45	23	23	28	16	23	28
First Presbyterian Church of Yorktown	55	23	23	28	16	23	28
Yorktown Jewish Center	60	25	25	30	18	25	30

Table 8: Calculated Site Average Construction Noise Levels – Minimum Equipment (dBA)

Receiver	Existing Daytime L_{eq}	Ground Clearing	Demolition	Excavation	Foundations	Building Assembly	Finishing
Winding Court	47	26	15	14	20	15	14
Deer Track Court	44	44	33	32	38	33	32
Fox Meadow Court	49	44	33	32	38	33	32
Old Crompond Road	53	51	40	39	45	40	39
Carpenter Road	44	52	41	40	45	41	40
Crompond Elementary School	53	15	4	3	9	4	3
Roces Alternative High School	45	22	11	10	16	11	10
First Presbyterian Church of Yorktown	55	22	11	10	16	11	10
Yorktown Jewish Center	60	24	13	12	18	13	12

The data presented in Table 7 reflect the average sound level occurring when the maximum amount of construction equipment is operating at the site, a conservative estimate. The data in Table 8 reflect the average sound level when only the minimum equipment required is in operation. Demolition noise sources associated with removing the existing structures are anticipated to be similar to those associated with Project construction.

The construction sound levels presented above indicate that construction noise will be above existing conditions at the most proximate receptors (e.g., Old Crompond Road and Carpenter Road), and mainly when the maximum equipment is in operation. Most construction phases will generate noise levels that will be below ambient levels, especially when the minimum amount of equipment is in operation (Table 8). Construction noise levels will be insignificant at the more distant noise sensitive areas.

Construction noise and equipment will not be unusual, as they will be typical of those associated with any commercial development. It is important to note that the equipment presented is not used in each phase of construction. Further, equipment used is not generally operated continuously, nor is all of the equipment always operated simultaneously. There will therefore be

times when no equipment is operating and noise will be at ambient levels. Construction activities are also scheduled to occur during daytime hours, when many people are at work and away from home.

The construction noise levels presented above are those that would be experienced for people outdoors. A building (house) will provide significant attenuation for those who are indoors. Sound levels can be expected to be up to 27 dBA lower indoors with the windows closed. Even in homes with the windows open, indoor sound levels can be reduced by up to 17 dBA (USEPA, 1978).

9.1 Construction Noise Mitigation

The short-term nature of construction activities does not warrant any physical mitigation measures. Construction noise will also be temporary in nature. However, as a general good construction practice to reduce construction noise to the greatest extent possible and practical, functional mufflers will be maintained on all construction equipment.

The Town of Yorktown noise ordinance is designed to minimize potential noise impacts due to construction by limiting construction activities to between the hours of 7:00 a.m. to 11:00 p.m. on Monday through Thursday, 7:00 a.m. to 10:00 p.m. on Friday, 8:00 a.m. to 10:00 p.m. on Saturday and 8 a.m. to 11 p.m. on Sunday. It is therefore considered to be an effective administrative mitigation measure, and project construction hours will be in compliance with the ordinance.

Accordingly, no long term or permanent noise impacts are anticipated due to Project construction activities.

10.0 CONCLUSION

A noise impact assessment was conducted for the proposed Costco facility. The assessment included an ambient noise monitoring program to characterize and quantify the existing noise environment, and a noise modeling study to determine noise levels expected from construction and operation of the Project.

The ambient noise monitoring program revealed that significant insect noise was present during the nighttime hours. The insect component of the sound spectrum was identified and removed in

order to provide ambient noise level data that would be more representative of colder weather months, and therefore be more conservative. Ambient daytime noise levels at proximate residential locations ranged from 44 dBA to 53 dBA, while nighttime noise levels ranged from 43 dBA to 47 dBA. Daytime noise monitoring was also conducted at non-residential noise sensitive areas further from the site, in order to obtain data for evaluation of potential construction noise impacts. Existing noise sources at all locations included vehicular traffic sounds from the Taconic State Parkway and Route 35/Crompond Road, traffic on local roads, and natural sounds such as insects and birds.

A noise modeling study was conducted in order to calculate noise levels from the rooftop HVAC and refrigeration units, truck deliveries, and Project construction. The modeling analysis revealed that noise levels due to simultaneous operation of all HVAC and refrigeration noise would be below the existing nighttime ambient noise levels at all proximate residential locations, with increases in future noise of one dBA or less. Similar results were obtained for nighttime delivery truck traffic, with increases of two dBA or less. Potential noise level increases due to increased vehicular traffic associated with the Project also showed insignificant increases of about one dBA or less. These projected increases for all operational aspects of the Project are well below the New York State Department of Environmental Conservation's noise impact criterion of a six dBA increase. Accordingly, no noise impacts are anticipated due to Project operations.

Construction noise levels were also modeled. The more distant non-residential noise sensitive areas were included in the construction analysis. Calculated construction noise would be above existing ambient conditions at the most proximate residences on Old Crompond Road and Carpenter Road, but mainly when the maximum equipment is in operation. Most construction activity will generate noise levels that are below existing ambient conditions. Construction noise will be insignificant at the non-residential noise sensitive locations.

Construction will occur during the hours stipulated in the Town of Yorktown noise ordinance. The noise ordinance is designed to minimize potential noise impacts by limiting the hours of construction, and is therefore recognized as an administrative mitigation measure. The short term nature of construction does not warrant any physical noise mitigation measures.

Figure 1: Monitoring Locations

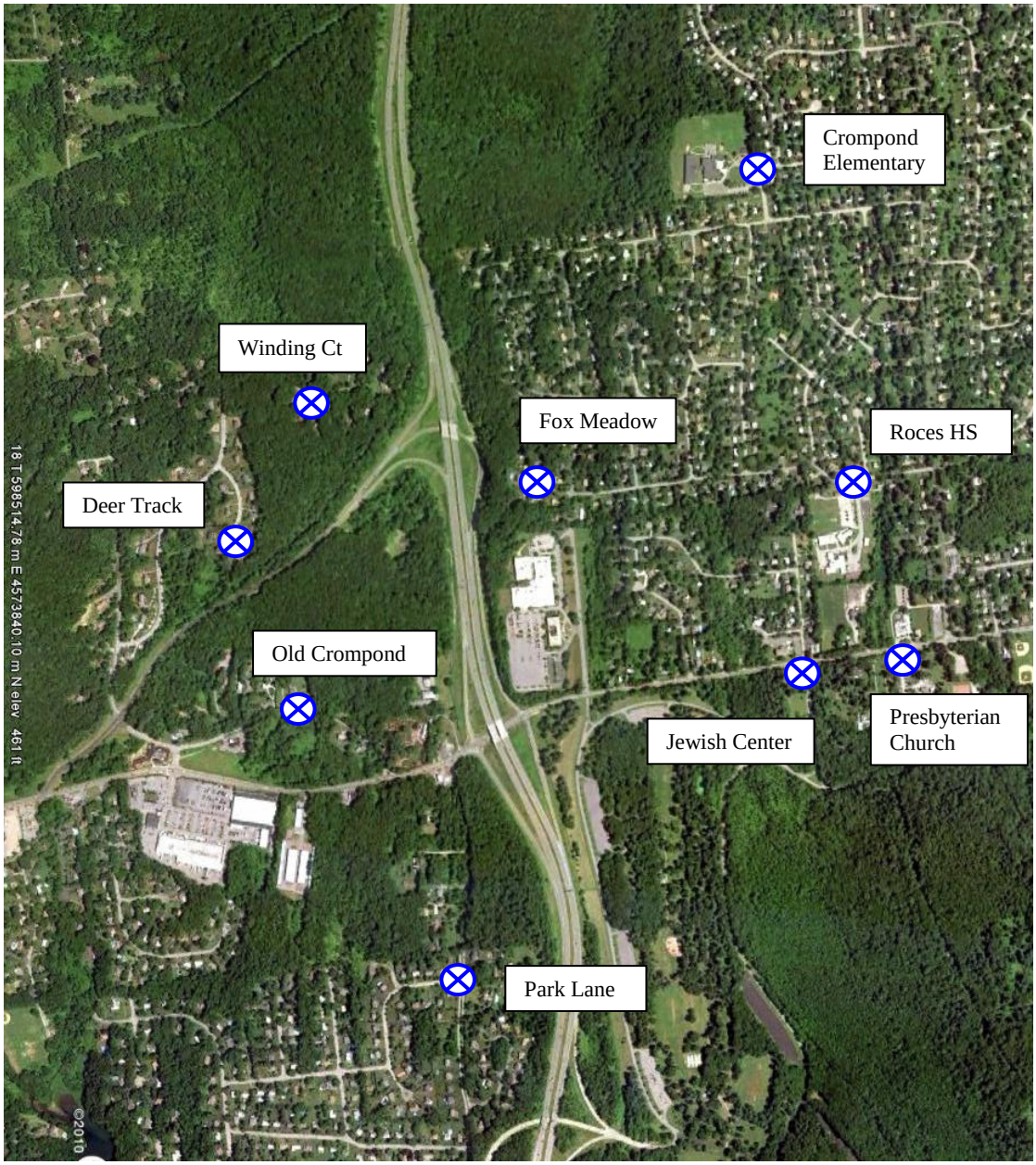
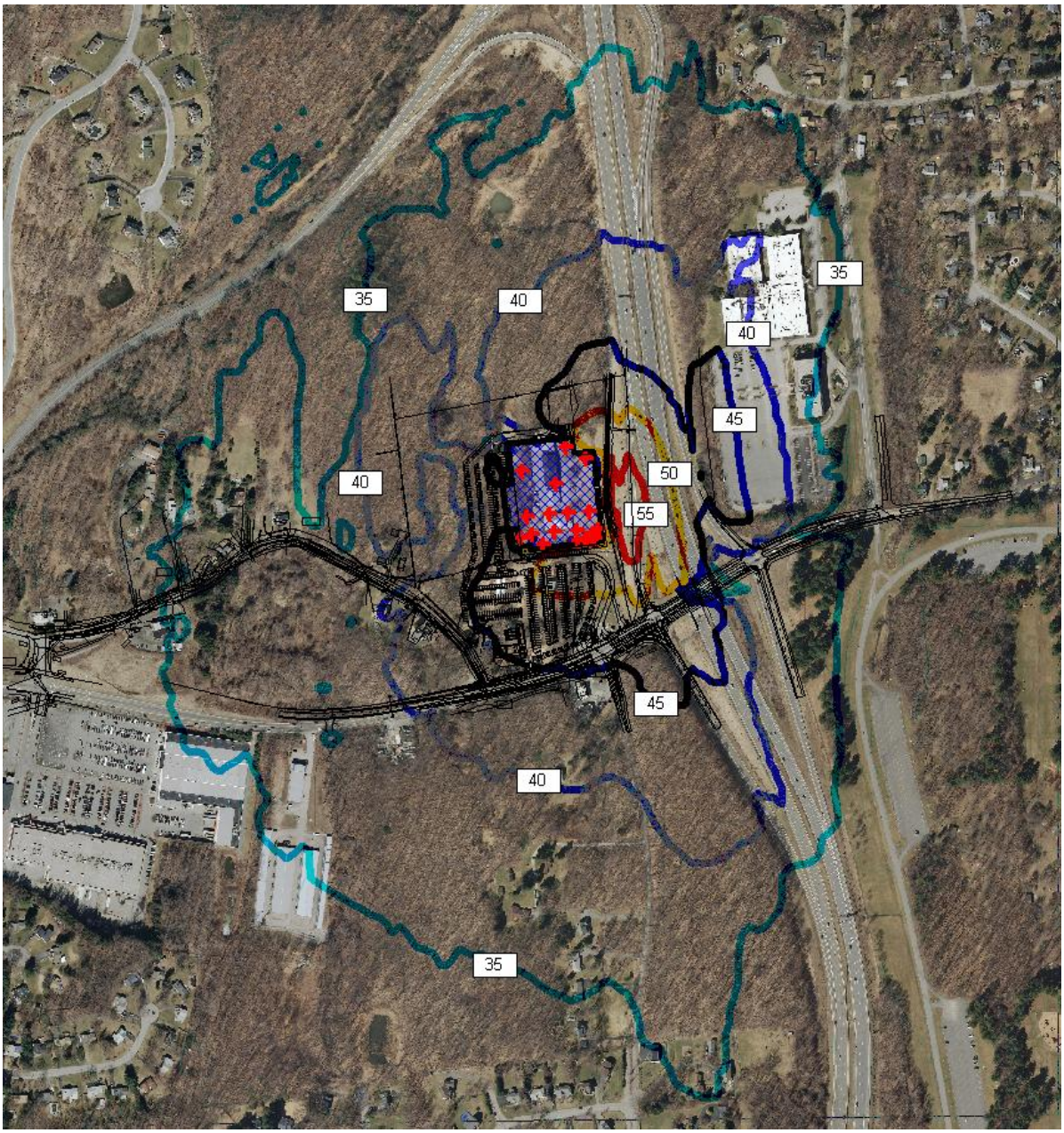


Figure 2: Operational Noise Contour Map (dBA)



Appendix A

Sound Level Meter Certification Sheets

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC and APLAC signatory)

NVLAP®

NVLAP Lab Code: 200625-0

Calibration Certificate No.23731

Instrument:	**Sound Level Meter**	*Date Calibrated:* **4/21/2011**	*Cal Due:*	
Model:	**NL21**	*Status:*	**Received**	**Sent**
Manufacturer:	**Rion**	*In tolerance:*	**X**	**X**
Serial number:	**00765697**	*Out of tolerance:*		
Tested with:	**Microphone UC52 s/n 109041**	*See comments:*		
	Preamplifier NH21 s/n 20540	*Contains non-accredited tests:*	**__Yes X No**	
Type (class):	**2**	*Calibration service:*	**__ Basic X Standard**	
Customer:	**TRC Environmental Corp.**	*Address:*	**1200 Wall Street West, 2nd Floor**	
Tel/Fax:	**201-933-5541**		**Lyndhurst, NJ 07071**	

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., 06/07/2005
SLM & Dosimeters – Acoustical Tests, Scantek Inc., 06/15/2005

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31071	Jul 6, 2010	Scantek, Inc./ NVLAP	Jul 6, 2011
DS-360-SRS	Function Generator	88077	Aug 17, 2010	ACR Env./ A2LA	Aug 17, 2012
34401A-Agilent Technologies	Digital Voltmeter	MY47011118	Aug 17, 2010	ACR Env./ A2LA	Aug 17, 2011
HM30-Thommen	Meteo Station	1040170/39633	Jun 26, 2010	ACR Env./ A2LA	Dec 26, 2011
PC Program 1019 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1251-Norsonic	Calibrator	30878	Dec 7, 2010	Scantek, Inc./ NVLAP	Dec 7, 2011
4226-Bruel&Kjaer	Multifunction calibrator	2305103	Apr 13, 2011	Scantek, Inc./ NVLAP	Apr 13, 2012

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.5 °C	100.95 kPa	40.5 %RH

Calibrated by	Kristen van Otterloo	Checked by	Mariana Buzduga
Signature	Kristen van Otterloo	Signature	[illegible]
Date	4/21/2011	Date	4/21/2011

Document stored as: Z:\Calibration Lab\SLM 2011\RIONL21_00765697_M1.doc

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC and APLAC signatory)

NVLAP®

NVLAP Lab Code: 200625-0

Calibration Certificate No.24300

Instrument:	**Sound Level Meter**	*Date Calibrated:* **7/21/2011**	*Cal Due:* **7/21/2012**
Model:	**NA27**	*Status:*	**Received** / **Sent**
Manufacturer:	**Rion**	*In tolerance:*	**X** / **X**
Serial number:	**00701322**	*Out of tolerance:*	
Tested with:	**Microphone UC53A s/n 313155**	*See comments:*	
	Preamplifier NH20 s/n 05107	*Contains non-accredited tests:*	__Yes _X_ No
Type (class):	**1**	*Calibration service:*	__ Basic _X_ Standard
Customer:	**TRC Environmental Corp.**	*Address:*	**1200 Wall Street West, 2nd Floor**
Tel/Fax:	**201-933-5541**		**Lyndhurst, NJ 07071**

Tested in accordance with the following procedures and standards:
Calibration of Sound Level Meters, Scantek Inc., 06/07/2005
SLM & Dosimeters – Acoustical Tests, Scantek Inc., 06/15/2005

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Sep 10, 2010	Scantek, Inc./NVLAP	Sep 10, 2011
DS-360-SRS	Function Generator	33584	Oct 5, 2009	ACR. Env / A2LA	Oct 5, 2011
34401A-Agilent Technologies	Digital Voltmeter	US36120731	Sep 3, 2010	ACR Env. / A2LA	Sep 3, 2011
HM30-Thommen	Meteo Station	1040170/39633	Jun 26, 2010	ACR Env. / A2LA	Dec 26, 2011
PC Program 1019 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1251-Norsonic	Calibrator	30878	Dec 7, 2010	Scantek, Inc./ NVLAP	Dec 7, 2011

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK).

Environmental conditions:

Temperature (°C)	Barometric pressure (kPa)	Relative Humidity (%)
23.5 °C	99.650 kPa	53.4 %RH

Calibrated by	Kristen van Otterloo	**Checked by**	Mariana Buzduga
Signature	Kristen van Otterloo	Signature	[illegible]
Date	7/21/2011	Date	7/25/2011

Document stored as: Z:\Calibration Lab\SLM 2011\RIONA27_00701322_M2.doc

Scantek, Inc.
CALIBRATION LABORATORY

ISO 17025: 2005, ANSI/NCSL Z540:1994 Part 1
ACCREDITED by NVLAP (an ILAC and APLAC signatory)

NVLAP®
NVLAP Lab Code: 200625-0

Calibration Certificate No.23732

Instrument: **Acoustical Calibrator**
Model: **4231**
Manufacturer: **Brüel and Kjær**
Serial number: **2115610**
Class (IEC 60942): **1**
Barometer type:
Barometer s/n:

Date Calibrated: **4/21/2011** *Cal Due:*

Status:	Received	Sent
In tolerance:	X	X
Out of tolerance:		
See comments:		

Contains non-accredited tests: __Yes _X_ No

Customer: **TRC Environmental Corp.**
Tel/Fax: **201-933-5541**
Address: **1200 Wall Street West, 2nd Floor**
Lyndhurst, NJ 07071

Tested in accordance with the following procedures and standards:
Calibration of Acoustical Calibrators, Scantek Inc., 06/06/2005

Instrumentation used for calibration: Nor-1504 Norsonic Test System:

Instrument - Manufacturer	Description	S/N	Cal. Date	Traceability evidence Cal. Lab / Accreditation	Cal. Due
483B-Norsonic	SME Cal Unit	31052	Sep 10, 2010	Scantek, Inc./NVLAP	Sep 10, 2011
DS-360-SRS	Function Generator	33584	Oct 5, 2009	ACR. Env / A2LA	Oct 5, 2011
34401A-Agilent	Digital Voltmeter	US36120731	Sep 3, 2010	ACR Env. / A2LA	Sep 3, 2011
HM30-Thommen	Meteo Station	1040170/39633	Jun 26, 2010	ACR Env. / A2LA	Dec 26, 2011
8903-HP	Audio Analyzer	2514A05691	Dec 1, 2010	ACR Env. / A2LA	Dec 1, 2013
PC Program 1018 Norsonic	Calibration software	v.5.0	Validated July 2009	-	-
1253-Norsonic	Calibrator	28326	Dec 6, 2010	Scantek, Inc./ NVLAP	Dec 6, 2011
1203-Norsonic	Preamplifier	92268	Dec 6, 2010	Scantek, Inc./ NVLAP	Dec 6, 2011
4180-Brüel&Kjær	Microphone	2246115	Dec 14, 2009	NPL (UK) / UKAS	Dec 14, 2011

Instrumentation and test results are traceable to SI (International System of Units) through standards maintained by NIST (USA) and NPL (UK)

Calibrated by	Kristen van Otterloo	Checked by	Mariana Buzduga
Signature	Kristen van Otterloo	Signature	[illegible]
Date	4/21/2011	Date	4/21/2011

Document stored as: Z:\Calibration Lab\Cal 2011\BNK4231_2115610_M1.doc

Appendix B

CadnaA Model Input and Output Files

Sound Levels

Name	ID	Type	Oktave Spectrum (dB)												Source
			Weight.	31.5	63	125	250	500	1000	2000	4000	8000	A	lin	
AC1,2,32 TRANE YHC048E4RLA	ACa	Lw			80	86	84	85	83	79	73	67	87.2	91.4	trane literature
AC3 TRANE YFD181E4LA	ACb	Lw			85	91	89	90	88	84	78	72	92.2	96.4	trane literature, octaves estimated
AC4 TRANE YHC092E4RLA	ACc	Lw		0	89	87	91	85	80	77	73	66	87.3	94.8	Trane literature
AC5,6 TRANE 4YCC3018A1040A	ACd	Lw			67	73	71	72	70	66	60	54	74.2	78.4	trane literature, octaves estimated
AC7thru18 TRANE YFD301E4HA	ACe	Lw			87	93	91	92	90	86	80	74	94.2	98.4	trane literature, octaves estimated
trucks	trk	Lw		92	98	103	106	101	99	96	90	84	104.3	109.7	typical truck spectrum

Point Sources

Name	ID	Result. PWL			Lw / Li		Correction			Sound Reduction		K0	Freq.	Direct.	Height		Coordinates		
		Day	Evening	Night	Type	Value	Day	Evening	Night	R	Area						X	Y	Z
		(dBA)	(dBA)	(dBA)			dB(A)	dB(A)	dB(A)		(m²)	(dB)	(Hz)		(m)		(m)	(m)	(m)
AC1	ac1	87.2	87.2	87.2	Lw	ACa	0	0	0			0		(none)	10.75	r	598553.7	4571943	145.75
AC2	ac2	87.2	87.2	87.2	Lw	ACa	0	0	0			0		(none)	10.75	r	598538.6	4571931	145.75
AC3	ac3	92.2	92.2	92.2	Lw	ACb	0	0	0			0		(none)	10.75	r	598528.4	4571928	145.75
AC4	ac4	87.3	87.3	87.3	Lw	ACc	0	0	0			0		(none)	10.75	r	598486.1	4571925	145.75
AC5	ac5	74.2	74.2	74.2	Lw	ACd	0	0	0			0		(none)	10.75	r	598458.8	4571932	145.75
AC6	ac6	74.2	74.2	74.2	Lw	ACd	0	0	0			0		(none)	10.75	r	598548.8	4571933	145.75
AC7	ac7	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598546.7	4571938	145.75
AC8	ac8	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598542.2	4571965	145.75
AC9	ac9	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598538.2	4572029	145.75
AC10	ac10	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598526.9	4571942	145.75
AC11	ac11	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598517	4571963	145.75
AC12	ac12	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598501.1	4571998	145.75
AC13	ac13	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598500.1	4571939	145.75
AC14	ac14	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598492.9	4571961	145.75
AC15	ac15	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598513.4	4572043	145.75
AC16	ac16	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598472.3	4571937	145.75
AC17	ac17	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598465.6	4571958	145.75
AC18	ac18	94.2	94.2	94.2	Lw	ACe	0	0	0			0		(none)	10.75	r	598459.8	4572013	145.75
AC32	ac32	87.2	87.2	87.2	Lw	ACa	0	0	0			0		(none)	10.75	r	598543.7	4571931	145.75
truck	truck	104.3	104.3	104.3	Lw	trk	0	0	0			0		(none)	2	r	598477.1	4572054	137
truck	truck	104.3	104.3	104.3	Lw	trk	0	0	0			0		(none)	2	r	598423.6	4572047	137
truck	truck	104.3	104.3	104.3	Lw	trk	0	0	0			0		(none)	2	r	598563.9	4571916	137
truck	truck	118.3	118.3	118.3	Lw	trk	0	0	0			0		(none)	2	r	598470.5	4571782	136.85
truck	truck	118.3	118.3	118.3	Lw	trk	0	0	0			0		(none)	2	r	598556.8	4571823	142.82
truck	truck	104.3	104.3	104.3	Lw	trk	0	0	0			0		(none)	2	r	598555.9	4571993	137
truck	truck	104.3	104.3	104.3	Lw	trk	0	0	0			0		(none)	2	r	598483.1	4572055	137

Modeling Results HVAC Noise

Receiver			Octave Bands									Coordinates		
Name	ID	Total	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	X-easting	Y-northing	Z-height
		dBA	dB	dB	dB	dB	dB	dB	dB	dB	dB	m	m	m
Winding Ct		10.6		14.4	12.6	8.1	9.9	6.7	-2.1	-26.1	-96.5	598325.1	4572739	88
Deer Track Ct		34		30.9	33	31.1	33.2	30.2	22.4	2	-55.4	598002.9	4572345	115.8
Fox Meadow Ct		34.3		31.4	33.3	31	33.2	30.5	23.7	6.2	-46.2	598759.7	4572496	152.6
Old Crompond Rd		38.8		38.1	40.2	37.1	38.1	34.4	27.4	14.4	-11.8	598281.5	4571880	116.8
Norman Rd		38.2		34	36.5	34.2	36.5	34.4	29.3	16.2	-22.9	598582	4571562	150.6