



OLDEST TRAP SHOOTING CLUB IN THE USA  
ESTABLISHED MARCH 23, 1878  
CLUBHOUSE AT WATERWORKS POND  
AFFILIATED WITH THE NRA AND GO-NH

April 25, 2011

Selectmen, Town of Exeter  
10 Front Street, Town Offices  
Exeter, New Hampshire 03833

Re: Exeter Sportsman's Club Report to the Town, 2010

Honored Selectmen:

The Exeter Sportsman's Club (the "Club") is pleased to submit the following report for the year 2010 (including information to April 2011) for your consideration.

1. Membership. As required by the lease of 2009 (the "Lease"), at least 20% of the membership of the Club (at present 35%) are residents of the Town of Exeter; at least 2 of the Executive Committee (at present 5 of the 11 members) are residents of the Town of Exeter. We have delivered to you an affidavit to that effect. Total club membership has increased since last year.
2. Rent and taxes. As required by the Lease, the Club has paid rent and taxes due to date.
3. Lease, Section 16. As required by the Lease, Section 16, the Club has completed three shelters on the Rifle/Pistol range. One of these, at the 100-yard line, is a three-sided structure; the other two, at the 50- and 25-yard lines, are two-sided (to allow shooting from the longer distances). In last year's report, we indicated that the required berm had been completed.
4. Environment. As required by the Lease, the Club has completed an Environmental Stewardship Plan. Our draft of that plan was submitted for review and revision in late 2010 to Richard Peddicord Ph.D., an environmental scientist who is a nationally recognized expert in the field of Environmental Stewardship for the Shooting Sports. Incorporating Dr. Peddicord's input, our revised Environmental Stewardship Plan, April 2011 (the "ESP"), has been submitted to the Town. The summary impact of the ESP is that lead must be monitored, and if necessary either treated or recovered or both. At present, minimal lead is deposited in the backstop of the Rifle/Pistol Range (an estimated 200 to 300 pounds per year). At a normal pH of 6.2 to 8.5, lead is inert and does not break down. The pH on the Rifle/Pistol Range and of the backstop measures in the high 6's, so lead fired there is chemically inert. We have started a program to perform periodic pH testing of the soil and appropriate amounts of lime to the Range yearly (similar to liming a residential lawn) to keep the pH in this desirable range. We plan to put in place a lead recovery program to take place periodically as required, probably no more than once every few years.
5. Sound (noise). Under the Lease, Section 2, there is a commitment to meet with the Town at least once every five (5) years, to discuss matters of mutual interest. We have begun discussions of sound/noise issues with interested townspeople.

The Club has tested gunshot sound levels in the vicinity of the club, and we append our report on that subject. A summary follows:

- a. Sound is measured in dB (decibels), a logarithmic scale: a doubling of sound pressure is registered as 3 dB and a doubling of *perceived noise* is about 10 dB.
- b. The shelters attenuate sound about 10 dB when measured through the shelter wall. In the neighborhoods, this highly directional effect is only about 3 dB, i.e., it is dramatically less than it is immediately next to the shelter. The material (wood or metal) of the shelter roof does not have an appreciable effect on the shelter's ability to attenuate sound. The large earth berm attenuates sound by about 10-20 dB even at distances of several hundred yards beyond the berm.
- c. The objectively measured sound level in the neighborhoods is greatest in Windemere Circle, about 8 dB less in the Towle Ave neighborhood, and dramatically less on Allen Street and other points north. The sound of .22 lr shots (the most common and quietest caliber used) is audible but barely measurable at Windemere. The sound of .30-06 shots (one of the loudest firearms in use at the Club) is 76 dB at Windemere, 66 dB at Towle Ave., and is not measurable above ambient noise at Allen Street.
- d. Sound comparison: the sound of a .30-06 at Windemere is about the *same loudness* as the sound of normal traffic on Front Street outside the Exeter Post Office; the sound of a .30-06 at Towle Ave is about 4 dB *less* than the sound of a basketball being dribbled at 50 feet; the sound at Allen Street is barely audible above the ambient sound levels.

6. Neighbor relations. The Club is committed to having an open, positive relationship with our neighbors. We have received complaints from neighbors to the south relating to two types of noise: (a) shots heard in the early mornings in the fall, well before the official range opening time of 8:30 am; and (b) shots heard during Club hours.

Regarding shots in the early morning, we are confident such shots did not come from the Club. Since these shots were only reported during hunting season, and were heard before the range opening time, they are very likely attributable to legal hunting in the vicinity. We have informed our neighbors of this fact. (Our members are aware of our video surveillance system and that they will lose their membership if found shooting when the range is closed.)

Regarding shooting during Club hours, we observe that such is the nature of a gun club and such noise is permitted under state law without restriction. However, the Club *does understand* that unusual noises, especially those associated with activities one may not approve of (such as motorcycles, dogs barking in the night), or activities in which one does not participate (such as shooting guns), or those one cannot control (such as footsteps in the overhead apartment, dripping faucets), can be exceedingly annoying. Accordingly, we are concerned about our neighbors' perception of noise and have initiated discussions to see how we can work mutually to reduce their concerns. We will adopt reasonable measures as we are able to do so. As an example, the sound reduction produced by an indoor range --even if it were to be open 24/7/365-- would clearly benefit our neighbors. Our goal is that these discussions will be helpful to all parties.

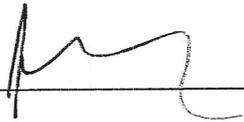
7. Club activities. Our club initiatives for 2009 and 2010 were focused on meeting Lease requirements. For 2011, we have adopted what we designate our "F.I.R.E." (fix, improve, remove, enhance) program to upgrade the Club premises. For example, we have replaced our Portsmouth Ave sign with an upgraded version. A part of this program is the discussions with the neighbors already mentioned.

We have re-organized ourselves internally so that each program will have a leader or champion. For example, we have begun discussions with the Boy Scouts about helping with their merit badge programs. Our annual Fishing Derby in May has been successful, with 119 local children participating in the rain in 2010. Instruction programs in firearms use are becoming increasingly popular, with pistol programs already full for the weekends of April 30 and May 21<sup>st</sup>. A self-defense pistol class for women in March was oversubscribed

and more are scheduled. We allow the Exeter Police Department exclusive use of the range for police training on designated days.

8. Club expectations. There is growing interest in the responsible handling of firearms and in training for the safe use thereof. Accordingly, the Club anticipates that its membership will continue to grow for the foreseeable future. We have recently conducted a web-based survey to assess our members' interests and the resulting need for facilities development. At present our facilities are adequate for existing activities, although there are several items on our "wish list". We are in the process of formulating a concrete vision for the club's future, and will communicate this plan to Town officials when it becomes finalized.

Respectfully submitted,

By:  \_\_\_\_\_

Bert Bourgeois, President, Exeter Sportsman's Club

Attachment: Sound Management Report of 3/29/11

# EXETER SPORTSMAN'S CLUB

## SOUND MEASUREMENT TECHNIQUES AND RESULTS

**Testing Date:** 8:30 am to 11:15 am March 29, 2011 (no leaves on trees)

**Weather:** clear skies, wind approx 10 mph from WNW, air temperature 35° to 45° during measurement sessions.

**Metering Device, Setup:** (see Appendix 1 for definition and examples of decibel [dB] levels)

- Quest Model 2700 Sound Level Meter (list price \$1,400)
- Type 2 Accuracy
- Quest Calibrator used to calibrate immediately before testing
- Windscreen
- Tripod with microphone at shoulder height aimed toward sound source

### Device Settings:

- IMPULSE Response for shots, SLOW response for ambient noise
- A Weighting
- Range settings: 40-100 dB, 60-120 dB or 80-140 dB depending on loudness of sound at measuring site
- Meter at least 4 feet away from observer and not near any structure (except shelters where indicated in table)
- Microphone pointed toward sound source

### Firearms and Firing Protocol:

- .22 pistol (quietest firearm on range): 116.8 dB measured in the open 20' to the side
- .30-06 rifle (among the loudest firearms shot on the range): 129.1 dB measured in the open 20' to the side
- Comparison shots from 12 gauge shotgun using 2.5" shells were equivalent in intensity to .30-06: 129.0 dB
- A total of 156 shots were fired from three different firing locations on the range:
  - 15 yard line (no shelter)
  - within the 25 yd line shelter (aluminum roof)
  - within the 50 yd line shelter (wood roof)

The direction of fire at the Exeter Sportsman's Club is directly to the east, 90° compass heading. The existing berm, and the northern walls of the existing shelters, are directly to the north of the line of fire. The southern walls of the existing shelters are directly to the south of the line of fire.

For each firing location and each metering location we fired and measured a total of 4 shots from each firearm, and took a log average. Shot-to-shot measurements were very consistent and reproducible.

**Metering Sites:** Distances and headings measured using Google Earth (see accompanying map, Appendix 2))

1. On the range in and out of shelters and on other side of existing berm
2. Windemere Circle, end of road, at yellow hydrant: 545 yards SSE of firing line @ 148° heading from firing line
3. 14 Towle at telephone pole north of house near Sleepy Hollow corner: 490 yds SSW of firing line @ 202° heading
4. Allen St west side 100 yds in from Portsmouth Ave: 835 yards NNW of firing line @ 327° heading
5. Holland Way (88 connector) west side 175 yd South of Stop & Shop, 25 yds in from road: 430 yds N of firing line @ 4° heading

### **Findings:**

#### On the range with and without berm:

Firing in the open and measuring sound to the north of the existing berm (left of firing position) showed that the berm alone attenuated sound by 19.4 dB (.22 pistol) and 11.7 dB (.30-06 rifle) compared to sound measured at an equivalent distance to the right of firing position.

#### Towle (SSW) site measurements:

The .22 pistol was barely audible at the Towle site, though not measurably louder than the ambient sound, 49 dB.

The .30-06 rifle measured 66.4 dB when fired from the 15 yard line, 63.7 dB when fired from the 25 yd shelter, and 64.3 dB when fired from the 50 yd shelter. Thus the shelters attenuated the sound by less than 3 dB, and the difference between shelters was less than 1 dB. A difference of 3 dB is barely perceptible to the human ear (Appendix 1).

#### Windemere (SSE) site measurements:

The .22 pistol was louder at the Windemere than at the Towle site, measuring 55.9 dB when fired from the 15 yd line, 51.4 dB from the 25 yd shelter, and 53.6 dB from the 50 yd shelter. The ambient sound was 48 dB. Thus the shelters attenuated the sound by less than 3 dB, and the difference between shelters was 2.2 dB. Reiterating, a difference of 3 dB is barely perceptible to the human ear (Appendix 1).

The .30-06 rifle was also louder at the Windemere than at the Towle site, measuring 76.4 dB when fired from the 15 yd line, 76.0 dB from the 25 yd shelter, and 73.4 dB from the 50 yd shelter. Again the shelters attenuated the sound by less than 3 dB, and the difference between shelters was 2.1 dB.

Allen and Holland Way (northern) site measurements:

From the Allen St. site, the .22 pistol was inaudible and the much louder .30-06 rifle, while faintly audible, was not measurably louder than ambient noise, 44 dB, from any firing position. From the Holland Way site, the .22 was similarly inaudible and the .30-06 was only 2 dB louder than ambient noise, which was 55-57 dB (more traffic noise was audible at this location than at other locations), from any firing position.

**Discussion:**

The sound level was less intense at the northern Allen and Holland Way sites than at the Towle and Windemere sites, despite the Holland Way site being closer to the range than the Towle site by 60 yards and closer than the Windemere site by 115 yards.

Though the 10 mph wind from the WNW at the time of testing may have played a minor role,<sup>1</sup> the major difference between the closer Holland Way site to the north and the Windemere and Towle sites to the south is the presence of the northern berm between the firing line and the Holland Way site. There is no berm to block the sound to the southern neighborhood sites at Windemere and Towle. (In addition, the Allen site is significantly further from the range to the north than the southern neighborhood sites by 290 to 345 yards. This distance factor, coupled with the presence of the berm to the north of the firing line and the buildings on Portsmouth Ave, rendered the sound of the .22 pistol inaudible and the .30-06 audible but not measurable above ambient noise at this site.)

Sound was louder at the Windemere site than at the Towle site, despite the Towle site being 55 yds closer to the firing line. This can perhaps be explained by the Windemere site being only 58° from the direction of fire, while the Towle site is 92°, or perpendicular, to the direction of fire. The sound of gunshots is highly directional, and more intense closer to the direction of fire.

Firing from within vs without the shelters made very little difference at any metering location outside the range itself, and the type of roof, whether wood or aluminum, made even less difference.

**Conclusions:**

Effect of berm: The berm, both at close range and at a distance of several hundred yards, attenuates the sound of gunshots from the loudest firearm by 12 to 25 dB. At a of 430 yards to the distance to the north beyond the berm, despite being closer than the Towle and Windemere sites, the sound level is so attenuated by the berm as to be barely measurable for the loudest rifle whether within or outside the shelters, even though at a closer distance.

Effect of shelters: The shelters at close range attenuate the sound by only about 3 dB when measured at a distance in the southern neighborhood. The effect is highly directional, as expected, at the range. The type of roof made very little difference, and this difference was inconsistent.

Thus effect of a vertical sound barrier such as the existing berm between the firing position and the point of sound measurement at a distance is the most profound. The effect of shelters is highly directional, and is minimized by distance. The effect of shelter roof-type, whether aluminum or wood, is minimal.

The “southern neighborhood” sites, Windemere Circle and 14 Towle, are the closest neighborhood sites to the range and, without an intervening berm, represent the area where sounds from the range is the loudest.

Compared to common sounds (Appendix 1):

- The loudness of traffic in front of the Exeter Post Office is similar to the .30-06 rifle (loudest) as heard in the Windemere site (the loudest of the two southern neighborhood sites).
- The sound of a basketball being dribbled at a distance of 50 feet is 4 dB louder than the .30-06 rifle at the Towle site and 6 dB less than the rifle at the Windemere site.
- The sound of a tennis ball dropping 6’ onto a hardwood floor measured at head height 3 feet away is similar to the .30-06 rifle as heard in the Windemere site (the loudest of the two southern neighborhood sites).

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1 Weather conditions for meaningful noise measurements are generally considered to be winds below 15 to 20 km/hr [9.3 – 12.5 mph] (even with a windscreen). . . “Shooting Ranges and Sound,” available on request.

## APPENDIX 1 Definition and Examples

A decibel (dB) is a logarithmic unit that indicates the ratio of the energy level of a sound a relative to a specified or implied reference level. A ratio in decibels is ten times the logarithm to base 10 of the ratio of two power quantities. Thus a difference of 3 dB between two sounds means that the louder sound has twice the intensity. A difference of 10 dB means that the louder sound has 10 times the intensity. Psychoacoustically, a sound that is 10 dB more intense is perceived as two times as loud. A difference of 3 dB is barely perceptible.<sup>1</sup>

Sample dB levels for common sounds, *including measurements we performed (indicated in italics)*:

30 dB	Whispered voice
40 dB	Refrigerator humming
50 dB	Library
60 dB	Conversational speech
70 dB	Business office, aircraft cabin during flight, <i>basketball dribbling heard from 50' away (our measurement)</i>
73 dB	<i>Traffic at Exeter Post Office (our measurement, no motorcycles)</i>
75 Db	<i>Dropping tennis ball onto hardwood floor measured head height 3 feet away (our measurement)</i>
80-85 dB	Heavy truck traffic, ringing alarm clock at 2 feet
87 dB	<i>Car door closing at 10 feet (our measurement)</i>
90 dB	<i>Hand clap 3 feet away (our measurement)</i>
90 dB	Power mower
95 Db	Motorcycle
100 dB	Jointer/Planer, crowd noise at football game
110 dB	Chain saw, pneumatic chipper, air hammer
120 dB	Rock and roll concert with electronic amplification
130 dB	Jet aircraft during takeoff at 100 yards

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<sup>1</sup>“A Guide to Noise Control in Minnesota,” available on request

## APPENDIX 2: Map of Metering Sites

dB Measurements shown are from the loudest firearm, the .30-06 rifle  
Note: no leaves on trees; wind from WNW at ~10 mph

