

► Nantucket Shooting Park Environmental Stewardship Plan Summary

Holdgate, Steven J. ► Nantucket Hunting Association Inc. ► 11/07/2012

Reference materials:

RCMP (Royal Canadian Mounted Police) Shooting Ranges and Sound
Nantucket Gun Range Noise Study 2007 - THALHEIMER ASSOCIATES
Nantucket Gun Range Noise Study – Revised 2012 - THALHEIMER ASSOCIATES

Best Management Practices for Lead at Outdoor Shooting Ranges - United States Environmental Protection
Agency EPA-902-B-01-001 Revised June 2005 Region 2
National Shooting Sports Foundation (NSSF), 203-426-1320, Environmental Aspects of Construction and
Management of Outdoor Shooting Ranges.

Nantucket Shooting Park Environmental Stewardship Plan Summary

The intent of this document is to outline and explain the key components that are to be utilized to mitigate negative impacts of gun fire noise and the use of firearm projectiles (bullets) containing lead at the proposed Nantucket Shooting Park. Both engineering/mechanical components as well as operational procedures are used to mitigate the effects of noise and lead. These controls and measures will be outlined in an Environmental Stewardship Plan (ESP) specific to the Nantucket Shooting Park and may be improved and/or expanded as better systems and funding become available. Plant and animal habitat mitigation approved by the Natural Heritage Endangered Species Program will also be referenced in the ESP.

NOISE MITIGATION

Early in the planning and permitting stages of the Shooting Park project, the Nantucket Hunting Association (NHA) had an acoustical engineer conduct a noise study that incorporated live fire noise measurements at four of the closest residential buildings. A second follow-up study was completed using a sophisticated computer model to calculate noise levels for a revised range plan layout.

The details of the study are not included in this document since the study reports have been made available and can be referenced separately. In summary, the report concluded that gun fire noise from both ranges are well below the Nantucket noise bylaw at all four locations and therefore do not require additional noise mitigation. The NHA decided to still consider noise mitigation during the siting and design phases and has incorporated several noise mitigating features into the design and operational requirements of the facility.

LOCATION & SITING

Location

The site location of the Shooting Park relative to the entire Island of Nantucket was considered as the first step of planning. Noise was a primary consideration and the proposed location is suited for this type of activity. The location included an informal shooting area where shooting activity has taken place for at least 30 or more years with no documented complaints. It is located nearby other loud noise producing activities that include the local airport and industrial park. The industrial park includes a power company with generators, an asphalt plant, several propane tank farms and sand/ aggregate crushing & loading sites. The industrial uses have since expanded to include a concrete plant and excavating company within several yards of the range. The area is also used for off-road motorcycle and ATV trail riding.

Siting

When planning the original site layout of the range facilities, the closest residences were considered for safety and noise purposes. For safety reasons it was decided that the rifle/pistol range was to be designed for total bullet containment or “no blue sky” arrangement with bullet baffles to prevent bullets from leaving the range. The total containment design can be oriented in any direction and still be safe. The NHA thought it was best to orientate the ranges on site so that the **direction of shooting** was in the opposite direction of the closest residential buildings. This will decrease the noise at those building locations since noise from a firearm is loudest in front of the muzzle or down range.

While working with the Town's Board of Selectmen as the Landlord of the property to negotiate an improved land lease agreement, it was agreed to re-orient the location of the rifle/pistol range to **increase the distance** of the loudest range from the closest residential buildings located to the southeast at Wigwam Road. A revised site plan was created that relocated the rifle/pistol range to the western boundary of the range property. This would also free up land that the Town could utilize as conservation restricted lands.

Topography was also considered in the original layout of the ranges. Since the rifles and pistols were measured as louder than shotguns shooting trap, it was decided to orient the rifle/pistol range at the lower elevation and stepping it into the hillside on the east side of the property. Due to the limited size of the lower elevations on the property this resulted in the trap range at the highest elevation, but was the least noisy of the shooting activity.

When the improved land lease was negotiated with the Town, the eastern portion of the property with the lower elevation was released back to the Town. Moving the rifle/pistol range further away from the Wigwam buildings to the west was thought to decrease the noise reaching Wigwam Road, but the increase in elevation may have increased the noise prorogation and negated the loss from increased distance. For this reason, the NHA decided to design the rifle/pistol range four feet below grade to "gain" back some noise mitigation. Since the ranges will be handicap accessible by wheelchair, four feet below grade was all that was feasible due to the shallow slope of the walkway needed per ADA codes to transition the four foot grade change within the limited footprint of the development area.

Structural Design

For safety, the rifle/pistol range is designed with earth berms and overhead bullet baffles to prevent errant bullets from exiting the range. While the main purpose of the earth berms is for safety, they also provide a "barrier effect" of reducing sound levels.

Structures can be designed to reduce the amount of sound energy that propagates from the source. The NHA has designed a covered firing line structure for the rifle/pistol range that can be enclosed with three walls in the near future as more funds become available. Acoustical absorption materials can then be added inside to help reduce the amount of sound exiting the remaining open side of the firing line. It is important to note that as part of the second follow-up noise study, the three walls were entered into the sound prediction modeling software and a reduction of only 1 decibel was calculated due to the fact the noise still propagates out the open down range side of the structure.

Also entered into the modeling software was a sound mitigation barrier wall to calculate how much sound levels would be decreased at the Wigwam Road residential area from the use of the Trap range. The size and density of a barrier wall required to reduce sound by 5 decibels at Wigwam Road would need to be at least 20 feet tall and 128 feet long. There is the possibility that the wall would not receive Historic District Committee (HDC) approval. For these reasons the wall was not included in the design.

Operational Restrictions

Another way to help reduce noise from a shooting range is to **limit the hours of shooting** at the range. During the negotiation to rewrite the land lease, both the NHA and Selectmen agreed to include restrictions to the amount of operating hours, per day, week and certain months of the year. These restrictions were to specifically address concerns expressed from Wigwam Road residents. The hours of operation are restricted to as few as one day per week during July and August.

A device and procedure to receive and document noise complaints was also made a requirement of the lease. The lease also specifies that if legitimate noise complaints violating the noise by-law persist, then the Town Selectmen or ten affected home owners may call a meeting to negotiate a solution. Further, the lease requires the establishment of an Advisory Board to monitor and oversee the public benefit of the range facility. The lease specifically dictates that the

members of the advisory board include a representative from the Wigwam Road Homeowners Association, as well as other abutting property representatives and a Selectman. The Advisory Board will report back to the Board of Selectmen. By means of a public hearing, the Board of Selectmen may amend the terms and restrictions of the lease.

LEAD CONTAMINATION MITIGATION

Several documents referencing lead mitigation at shooting ranges exist that include recommended best management practices to be utilized by range operators. As mentioned previously, the Nantucket Shooting Park will have an Environmental Stewardship Plan which will have a section dedicated to lead contamination mitigation. There are four basic management objectives to control lead contamination.

1. Keep lead in metallic form.
2. Minimize surface distribution of lead.
3. Prevent surface migration of lead.
4. Prevent lead from affecting wetlands or surface waters.

Lead Migration as a soluble metal

One way lead can migrate is by becoming soluble compounds like lead oxides, sulfates, carbonates and organic complexes. These soluble compounds result from lead oxidizing when exposed to prolonged moisture and/or acidic soil or water. Soluble or dissolved lead can be carried by storm water runoff and migrate through soils to ground water.

Keep Lead as a metal

Limiting contact of lead with water will help reduce the oxidizing of lead, as will controlling the pH level of the soil that is in contact with the lead. pH levels from 6 to 9 should be maintained. As mentioned previously, **the roof overhang above the bullet sand trap not only controls soil erosion, but minimizes the amount of water contact with the lead particles.**

Capturing soluble lead

Lead that becomes dissolved can be “absorbed” or precipitated out of solution. Materials containing carbonates and calcium type minerals will remove lead compounds from solution. Shell fragments mixed into the bottom & back of the sand trap would allow lead in solution to move only a few feet. **Clay absorbs lead out of solution and can be used as a liner below the sand trap.** Clay also slows down the flow of water allowing more contact time with the clay for greater absorption. **An impervious liner can be used below the clay layer to prevent the downward migration of soluble lead to ground water. Water running off the face of the berm can also be treated in a runoff trench filled with limestone to manage the pH of the water.**

Prevent Surface Distribution of Lead

To better mitigate for the migration of lead, the lead should be concentrated in designated areas. This is easily done on the rifle and pistol ranges, since the projectiles are fired into designated target areas and bullet traps. Aerial target shooting with shotguns, as in trap shooting, spreads shot out over a larger surface area. For this reason, the **Nantucket Shooting Park will only allow the use of non-toxic shot on the trap range.** The EPA allows the use of Non-toxic shot for waterfowl hunting in wetlands as an alternative to lead shot. Trap shooters at the Nantucket Shooting Park are required to purchase their trap ammunition only from the Shooting Park, ensuring only non-toxic shot is used. Range Safety Officers are required at each range open for operation, and have the right to inspect any shooter's ammunition for compliance.

Lead Migration by Erosion

Lead can migrate in two basic ways. One way is lead particles can be “washed” or carried away with soil by water and wind. Management objective number three above addresses this by constructing range features that prevent or reduce soil erosion. The Nantucket Shooting Park will include bullet back stops made of earth berms with sand traps. The bullet trap is composed of clean sand that stops

bullets within approximately a 3 foot depth. These berms will be sloped and stabilized sufficiently to deter storm water erosion. At a point on the berm above the bullet sand trap, a roof projection or "eyebrow" will protrude out to reduce the amount of rain water contacting the bullet impact area further reducing water erosion that can carry lead particles out of the sand trap. Wind erosion is minimized because the rifle/pistol range is depressed four feet below grade with at least eight feet high side berms and at least a twenty foot high back berm acting as wind breaks. Areas not affected by bullet impacts will have vegetation growth to help stabilize the soil.

Removal of Lead

Periodic removal or mining of the lead from the sand bullet trap is a recommended best practice that will be included in the Environmental Stewardship plan for the Nantucket Shooting Park. Frequent surface sifting and raking can be accomplished by range volunteers to remove bullets and large lead fragments near the surface. More extensive mining of the entire bullet trap is to be conducted as determined by usage and as recommended by lead removal companies and consultants. Shooters are asked to document the amount of rounds fired at each range to help determine when it is feasible to mine the lead. The removal process involves digging out the entire sand trap and sifting, and washing the soil to separate the lead particles. Some of the cleaned sand along with new sand and treatment materials is replaced with a new liner if necessary. Recovering the lead from the range is exempted from the Resource Conservation and Recovery Act (RCRA) Subtitle C. The EPA considers this to be range maintenance and not hazardous waste management.

Wetland & Surface Water

Lead should be prevented from accumulating in bodies of water to prevent migration as discussed previously. Wildlife can also be affected, by ingesting lead shot and fragments. Waterfowl have been known to ingest lead shot and for that reason the EPA has banned lead shot for waterfowl hunting to reduce lead accumulation in wetlands. The Nantucket Shooting Park is located in an area where no

wetlands exist and no surface waters are to be created where lead projectiles could be deposited.

Long Term Management

The Environmental Stewardship Plan will be periodically reviewed and updates made as necessary to improve the Nantucket Shooting Park for the benefit of both the shooters and the neighbors. The Nantucket Hunting Association continues to work with nearby neighbors in order to ensure that environmental issues are addressed.