Memorandum

PROJECT:	IN DNR Clark State Forest New Shooting Range 2019-031.CSF	DATE:	6/19/2020
TO:	Matt Pore, IN DNR Engineering	SUBJECT:	Acoustic Design Considerations Memorandum
FROM:	Kyle Miller, Schmidt Associates		
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MEMORANDUM

This memorandum is in reference to the design of the new shooting range for the Indiana Department of Natural Resources at Clark State Forest in Henryville, IN. Specifically, this memo is in reference to the implementation of acoustic systems planned for the project to minimize sound escapement from the range and to minimize sound levels to users of the range and the adjacent range building.

The new range will consist of a Pistol/Rifle range for 33 shooting positions at distances of 10 yards, 50 feet, 25 yards, 50 yards, and 100 yards. The range will have a fixed firing line with movable target locations, side walls, overhead concrete baffles to control round escapement, and earth backstops with horizontal bullet catchers. The range will also include the design of a Range Control Building with a sales/range control area, storage, restrooms, mechanical/electrical room, and a meeting room. Other components include an archery range and a 5-stand shotgun range.

We are not aware of a sound ordinance that would be in effect for Clark State Forest. In the absence of a sound ordinance, we are utilizing information from the NRA Range Source Book which gives NRA's recommendations for decibel levels and sound barriers. This information is included at the back of this memo.

Acoustics considerations and components for the range are summarized as follows:

- An acoustic study is being performed to test pre-development conditions to give guidance for acoustical design of the new range facilities. Post-development conditions will also be tested to compare the intended results with the actual results and determine if additional improvements are needed.
- There are homes about ½-mile from the site. As such, the range is proposed to be located and oriented in such a way to take advantage of the surrounding forest and adjacent topography in order to direct sound in the opposite direction of the homes.
- Reducing noise close to the source (shooting) is the best approach for controlling sound escapement. The rifle/pistol ranges will be constructed with tall walls and earth backstops that can act as sound barriers. If deemed necessary, sound treatment in the form of sound absorption panels or a troweled-on product can be placed on the range walls to absorb sound and reduce "bounce-back" that can travel offsite. Adding sound treatment to the first few rows of baffles can also be considered for additional sound control.
- Shotgun (clays) activities cannot be conducted with walls. However, the direction of fire is proposed to be northerly which will minimize the sounds directed to the south were the homes are located.

- Since the range will be designed to keep sound from leaving the range, range users and operators should be required to wear ear protection while the range is active.
- The Range Control Building will be built with building materials and insulation that will help reduce sound transfer from the range into the building to lessen the noise for building occupants.

NRA Range Source Book Information:

3.03.2 Existing Conditions

3.03.2.1 What are the existing conditions at the proposed or existing site? Study the environment to determine what impact is occurring. This is the reason an environmental analysis (EA) is necessary. Conducting an EA requires a thorough review to determine if there is any reason to implement a major and costly sound abatement program. It requires a complete description of what may or may not occur if the range is built. (See Section I, Chap. 3, paragraph 2.14 for guidance and procedures for conducting an environmental analysis.)

3.03.3 Future Conditions

3.03.3.1 As a general guide, the following categories were developed by the NRA based on field and text book work:

(1) Unacceptable: If the sound level exceeds 90 dB(A) for 1 hour out or 24 or exceeds 85 dB(A) for 8 hours out of 24 and the receiver is less than 1/4 mile from the sound source.

(2) Discretionary: Normally Acceptable, if the level exceeds 80 dB(A) for 8 hours out of 24 or if there are "loud" impulsive sounds (referring to sonic booms, artillery, etc.) on site and the distance from the property boundary and the receiver is one mile or more.

(3) Discretionary: Normally acceptable if the level does not exceed 75 dB(A) at the property boundary more than 6 hours out of 24 hours and distance from the boundary line and the receiver is over ½ mile.

(4) Acceptable: If the sound levels at the receiver do not exceed 65 dB(A) more than 8 hours out of 24 or activities do not extend into the nighttime hours of 10 p.m. through 7 a.m.

Active shooting is to take place during the daytime hours of 7 a.m. to 10 p.m., with curtailed, but not necessarily discontinued activities during evening hours of 7 p.m. to10 p.m. Shooting activities should not continue into nighttime hours, between 10 p.m. and 7 a.m. unless needed for mandatory low light training by law enforcement personnel.

3.03.10 Noise Abatement Programs

3.03.10.1 Noise abatement programs are necessary on all ranges from the standpoint of the user. Hearing protection should be a requirement for all users who are within 50 feet of the firing line.

3.03.10.2 Sound abatement shields or barriers should be installed on ranges where neighbors are within 1/4 mile of the facility unless significant natural barriers exist. Any fixtures or terrain features must serve either to redirect or capture sound. Exact configurations depend upon site characteristics.