

## Shooting ranges health & cost

“Environmental noise pollution relates to ambient sound levels beyond the comfort levels as caused by traffic, construction, industrial, as well as some recreational activities. It can aggravate serious direct as well as indirect health effects, for example damage to hearing or causes stress (CCOHS, Stephen A Stansfeld & Mark P Matheson)

Noise can be continuous, variable, intermittent or impulsive depending on how it changes over time. Continuous noise is noise which remains constant and stable over a given time period. There is some evidence that the hazard from impulse noise is more severe than that from other types of noise (Dunn et al. 1991; Thiery and Meyer-Bisch 1988).

Noise perception: A change of three decibel is noticeable; five is clearly noticeable; and ten is perceived as twice as loud (BS 8233:1999 Environmental Noise)

Shooting range noise comprises two different components: the firing noise, or muzzle blast, and the bullet's flight noise, or supersonic boom. They usually occur so close in time to each other that they cannot be told apart by listening or in regular measurements. Impulsive noise from firearms on the shooting ranges varies from 120 to 160 dB (C.)

A-weighted sound energy level	dB(c)
Rifles	138
Shotguns	136/160
Pistols	130
.22LR rifles	120
.22 calibre pistols	120

The assessment, measurement, and calculation of noise are not strictly speaking best available techniques, but they are necessary for determining and dimensioning the techniques (BS EN ISO 17201). The results have a rather large effect on the dimensioning of the noise abatement need, and the scope and costs of the measures.

With regard to noise, the location of the shooting range should be selected so that the distance to the exposed sites is as large as possible. The locations of residential buildings, holiday homes, and healthcare and educational institutes in the surroundings of the planned location of the range must be determined to a distance of 3.5 km. The orientation of the range can affect the location of the noise area, as the noise radiates most effectively in the direction of firing.

The firing stands enclosure at a shooting range usually significantly attenuates the noise propagating to the sides and the rear sector, compared to a situation without the enclosure. If the enclosure is a sturdy structure, closed from the sides and the rear, the noise propagating directly through the walls will be attenuated by around 15–20 dB.

For noise abatement in the direction of firing, a noise berm or a combination of a noise berm and screen is suitable, also noise screens or berms in the side and rear directions. Furthermore, a firing line enclosure can be used for noise abatement at trap ranges; however, at skeet ranges, an enclosure cannot be used.

The firing directions at the different stands may also be clearly different from each other, meaning that the noise propagation areas can also be clearly different. One can therefore influence noise propagation by planning the positioning of the firing stands.

A noise-reducing firing enclosure can only be used for the firing stand of a trap range in which case the side and rear walls of the enclosure are solid structures. At a range that is in competition use, the rear wall of the enclosure must be sufficiently transparent to enable the judges to have a visual contact with the shooters. An attenuation of around 10 dB can be achieved in the rear sector with a transparent enclosure with a lot of windows.

#### Barrier attenuation cost of the backstop berm [dB]

Barrier Range,	shooting	Barrier height/length	Price EUR
<b>Side berm</b>	rifle , prone	3.5 m / 150 m	50, 000
<b>Side barrier</b>	rifle , prone	3.5 m / 150 m	90, 000
<b>Backstop berm</b>	Prone, rifle	13 m / 20 m	40, 000
<b>Backstop berm</b>	Standing, pistol	4 m / 20 m	20, 000
<b>Backstop berm</b>	Standing, shotgun	12.5 m / 250 m	500, 000



As a rule, only noise barriers, or screens, berms, and their combinations, are suitable for the prevention of noise propagation at shotgun ranges. Noise screens are not usually used in the front direction.

With regard to coniferous trees, spruce is clearly more effective than pine. Woods provide 0...4 dB of attenuation, optimally even slightly more.

Noise control measures resulting in an abatement of over 15 dB are very massive and expensive. Need for such extensive measures is usually an indication of the shooting range being in an unsuitable location. Therefore, it is reasonable to conclude that the resite of the shooting range is to the mutual benefit of all concerned.

#### Reference:

CIEH: Clay target shooting

WHO: Environmental health noise data statistics

Sara Kajander and Asko Parri (ed.): Management of the Environmental Impact of Shooting Ranges

Stockton Council: Noise abatement notice clay target shooting range