

The New Zealand Police Range Manual

**Principles for the design and
development of shooting ranges.**

**Wellington
2005**

Contents

Introduction

1. Range types
2. Certifying a range safe
3. Range Standing Orders
4. Danger Areas
5. Range and Danger Area signs
6. Range flags
7. Firing points and firing lines
8. Range floor
9. Backstops
10. Berms and side walls
11. Closing a range

Source documents

This Range Manual refers to 'current best practice'. In determining what 'current best practice' is the object is to establish that the procedures used are consistent with what professional peers are currently doing and that they are based on the best available research.

Examples of current best practice for range design and development are:
Ministry of Defence JSP403 (Joint Services Publication (JSP) 403 – *Handbook of Defence Land Ranges Safety, Volume II – Design Construction and Maintenance of Small Arms, Infantry Weapon Systems and 30mm Weapon System Ranges*).

and,

Range Design and Construction Guidelines produced by the Canadian Firearms Centre.

and,

The New Zealand Pistol Association Range Manual (2005)

Approval

This posting of this Range Manual is approved by:

The National Manager Operations
Superintendent Tony McLeod
July 2005

Introduction

These guidelines replace the New Zealand Police Range Manual published in 1998, and all pre existing Range Manuals for civilian shooting ranges produced by the New Zealand Police.

The purpose of these guidelines is to set the principles that those responsible for operating a shooting range must follow if the range is to be considered 'safe'.

All ranges must be designed, or redeveloped to meet current best practice in terms of range construction and use. This includes complying with any legislated requirements relating to land use, particularly the Resource Management Act 1991, any Regional and/or Local Authority requirements and with the principles of the Treaty of Waitangi.

Shooting organisations in New Zealand, lead by the New Zealand Shoot Federation, have taken the lead in terms of shooter responsibility for range standards. As operators of ranges, shooting organisations and clubs, and in some cases individuals have a responsibility to ensure that land promoted as a shooting range is safe for that purpose. Failure to do so may render the organisation, club or individual operator criminally liable under section 145 of the Crimes Act 1961.

All individuals using firearms, or responsible for supervising the users of firearms, are responsible for ensuring that a firearm is not discharged near a dwelling place or public place so as to endanger property or to endanger, annoy or frighten any person (section 48 of the Arms Act 1983). They are also responsible for ensuring that firearms are not used in a careless manner (section 53 of the Arms Act 1983).

Organisations, clubs and individuals fulfill these obligations by ensuring that the ranges under their control meet current best practice of range design and that range standing orders are produced and applied during the use of those ranges.

This manual is written primarily as a guide for the design and construction of civilian ranges. Nothing in the Arms Act 1983 renders unlawful the carriage and possession of firearms and restricted weapons in the course of their duties by members of certain organisations, including Police and the New Zealand Defence Force. As a matter of best practice these organisations should follow the requirements of the Arms Act 1983 and Arms Regulations 1992 as closely as possible, except where there are good operational reasons why this should not be the case.

Pistol ranges

The principles outlined in these guidelines apply to the design and development of all ranges. They apply especially to ranges used for target pistol shooting.

These ranges must be approved by Police before being used for target pistol shooting (section 22(1)(a) Arms Regulations 1992).

Obtaining information about range design and development

Those wishing to design and develop a shooting range, or confirm that the range they have meets current best practice standards, should contact the range development committee of the national organisation responsible for the type of shooting that the range is intended to cater for. The links on this website can be used.

Acknowledgements

The New Zealand Police acknowledge the contribution of Bob Badland, now retired Firearms Programme Manager for the New Zealand Mountain Safety Council, and Mike Spray, his successor, for their continued interest in ensuring that the New Zealand Police Range Manual (1998) was updated in keeping with changes in range design and development standards.

The New Zealand Police also thanks Wally Cole of Range Development Associates for drafting this Range Manual, and for his work to ensure that the New Zealand Pistol Association Range Manual meets best practice standards.

The advice of Major Chris Lawrence has been invaluable.

We also thank our typist, Rebekah Green and editor, Jacqueline Chapman.

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1.Range Types

There are a number of different range types.

Standard Range

The standard outdoor range can have different configurations, dependent on the intended shooting activities. These ranges have a firing line or firing line(s), a target area, a suitable backstop and a downrange danger area. They may also have other features such as covered firing points, target mechanisms and berms.

Gallery Range

A range, built to standard range specifications, with a downrange shelter for target systems and/or target marking personnel.

Baffled Range

A range that has incorporated into its design a series of overhead, side and/or ground baffles, or similar construction features, that serve to contain all fired bullets and ricochets to the active range area. Baffled ranges may be reduced danger area ranges, to allow for a 'splash or splatter zone', or no danger area ranges.

Skeet and Trapshooting Range

A shotgun range designed for the discharge of shot at moving frangible targets, thrown on fixed flight paths, or within prescribed arcs.

Sporting Clay Range

A shotgun range designed for the discharge of shot at moving frangible targets thrown on fixed flight paths or within prescribed arcs. This range setting is designed to simulate hunting or field situations.

Field Firing Range

A range developed to simulate activity in the field, whether for sporting, police or military purposes. These ranges seldom have any backstop (or have a backstop that is not adequate). However, the danger area has the necessary depth, width and height to accommodate the appropriate danger area template(s).

'Active range area'

This term is used in these guidelines to describe the area within which the actual shooting activity takes place. Usually this is encompassed by a backstop at one end, with sidewalls or berms to each side, and the firing point(s) at the other end.

Ranges may be full, reduced or no danger area. This is addressed later in this manual.

2. Certifying a range as 'safe'

All ranges need to be certified safe. National shooting organisations are able to advise on this process.

Range operators should maintain a complete record of the range, filed for future reference. This may assist in any contention that a range is not safe, or where a person uses a range outside its authorised purpose.

Inspection and Certification as Safe

Inspection and certification of ranges as 'safe' and ensuring that they meet and comply with current best practice is the responsibility of the appropriate National Shooting Association concerned.

Pistol NZ, for example, have a policy that reinspection of ranges will be undertaken by a recognised Range Inspector on a regular and set basis to ensure that the range(s) still meets the required minimum standards.

Reinspection and recertification of any range, and renewed Police approval of pistol ranges, is necessary in any case where there have been significant structural changes made to a range, where existing structures have deteriorated or where the shooting activity has changed.

Range safety certification would cease to be valid:

- a. On the day after any expiry date on the certification,
- b. Should the range, or any part of the range cease to meet current best practice,
- c. Immediately any activity that is not approved by range standing orders, or any other lawful authority, is conducted,
- d. Immediately on the occurrence of any incident required to be reported to Police under section 58 of the Arms Act 1983.

Range Rules and Supervision (Management) – Range Officers

When in use a range should be under the direction of a (qualified) Range Officer. Each National Shooting Organisation provides a training service that prepares members to sit an examination to become qualified officers. (Every range user might take such a course as it covers information about the safe use of a range whether or not he/she qualifies as a Range Officer).

Every range must operate under established range rules, referred to as Range Standing Orders. Range standing orders set the parameters for safe use of the range.

Comment [J1]: Not sure about this sentence.

3. Range Standing Orders

Using firearms is an activity in which risk is inherent. The aim of the Range Standing Orders is to promote safe range operations, and to mitigate against potentially hazardous and preventable incidents.

Range Standing Orders are an important requirement for all ranges. They are used to describe the range(s) physically and to detail the usage conditions for which the range was designed. As an analogy, they can be compared to the owner's manual for a car.

They outline acceptable and unacceptable activities on the range.

Range Standing Orders should be clearly displayed at the range. All regular range users, including members, on joining the club, should receive and receipt as having received, a copy of these orders.

Comment [J2]: Capital letters used in previous sentence.

The Range Operator must ensure that everyone is made aware of changes to the Range Standing Orders. Range users should routinely review the Range Standing Orders as a refresher.

Range Standing Orders need not be complex. They must plainly describe the range(s) and their safe operation. They need to:

- ❑ Describe the key physical details of all ranges (including location, certificate of safety and any conditions imposed, danger area status, any air danger height information, first aid).
- ❑ Describe the hours/days of operation.
- ❑ Describe acceptable firearms/ calibers / bullet nature.
- ❑ Describe acceptable range activities (e.g. arcs of fire, target placement, authorised targets). Activities that are not described as acceptable are considered to be unacceptable.
- ❑ Review safety issues (e.g. hearing protection, eye protection, lead contamination).
- ❑ Describe warning flags, other warning signs and their use.
- ❑ Provide emergency information (e.g. hospital location, and phone numbers for Police and the Range Operator).
- ❑ Define any non-standard abbreviations, as well as all acronyms used.

It is recommended that each range within a facility has a sign on which the key Range Standing Orders and safety rules are listed. These signs are intended as a simple method of quickly reminding all users of the basic safe range operating procedures. They do not remove the requirement for the range facility to have a more detailed set of Range Standing Orders.

4. Danger Areas

Overshoot and Ricochet Projectiles

An overshoot is defined as a bullet (or projectile) that carries over, or beyond, a backstop. By definition, an overshoot projectile will not have struck any downrange object before traveling beyond the backstop. Overshoots are distinctly different from ricochets.

Ricochets are bullets (or projectiles), which have struck a surface or object, and had their trajectory altered as a result. Ricochets may or may not clear the backstop, sidewalls or berms.

Danger Area Definition

The danger area for a range is defined as the downrange area, forward and to each side of the firing point, that is designed, within the level of probability determined by current best practice, to contain bullets that pass over, or beyond, the backstop and/or sidewalls or berm. These include overshoots and bullets that ricochet off targets, the backstop, and other range surfaces (e.g. range floor).

Danger area design does not take into account all shots deliberately fired in breach of the shooting discipline the range is designed for, or in breach of Range Standing Orders. Where there is evidence of such wild firing, then the place where this is evident must be included in the danger area, and/or the range features must be modified to capture projectiles resulting from wild firing, and/or specific management criteria must be introduced through range standing orders to prevent wild firing from occurring.

Range Danger Areas

The design of the range, rules in place (Range Standing Orders), and supervision determine if a range is No Danger Area (NDA), Reduced Danger Area (RDA) or Full Danger Area (FDA) range.

A Full Danger Area Range exists when the shooting activity, Range Standing Orders and range design require a full template be applied describing the maximum possible range of the projectile or a range reduced by limiting the permitted quadrant elevation (so long as this shorter distance is not less than the maximum ricochet range).

A Reduced Danger Area can exist when the shooting activity, Range Standing Orders and range design combine with physical features, which may be natural or constructed, to limit the trajectory of any rounds fired, or any ricochets within an area that reduces the full danger area template.

Sometimes the danger area might be reduced significantly to include only a 'splash' or 'splatter' zone. This happens when all rounds are contained within the active range area, but due to the use of steel targets or target frames that produce splatter a danger area beyond the active range area is necessary.

If a range danger area can be reduced to include only 'splash' or 'splatter' then it is most likely to be a "No Danger Area" range. Pop-over (projectile or target debris resulting from high velocity ammunition strike or projectile and target debris from previous firing which has been re-energised by subsequent projectile strike) should also be considered.

A No Danger Area range is a range of such design that all projectiles, fired in accord with Range Standing Orders, and any ricochets, backsplash, splatter or pop-over are contained within the active range area.

Any reduction in the size of the range danger area can only be achieved in accord with current best practice. Range Operators must be wary of any attempt to reduce the danger area for the sake of convenience.

Effect of Trees in the Range Danger Areas

Heavy tree cover in a danger area, or atop a backstop, may be a desirable feature for an outdoor range in so far as trees add to the aesthetics of the facility and can serve to diminish noise.

Trees do not influence danger area considerations nor augment the height of a backstop. They can change with the seasons, or be removed by cuffing or burning.

Ownership/Control of the Range and Danger Area

A range cannot be certified safe if the required land and the associated danger area(s) are not under the control of the Range Operator when shooting takes place.

If the Range Operator does not directly control the range and danger area(s), then indirect control can be achieved through a 'land use' agreement between the land owner(s), or their agent(s), and the Range Operator. The agreement must specifically provide for the 'use' of the land as a range or range danger area.

It is desirable for the Range Operator to own, lease or otherwise directly control the required land. This way, any issues of future encroachment and possible changing land use, will not effect range operations.

Where the controller of the land on which the range and/or danger area are sited withdraws authority for the use of the land for this purpose the range must close, or be redesigned and redeveloped to exclude the affected land.

Similarly, if projectiles land in any place other than that which is directly or indirectly under the control of the range operator, and the controller of that land does not approve, then the range must close until the range is redesigned and redeveloped in such a way that this does not happen.

Effect of Hills, Topography and High Backstops on Range Danger Areas

The presence of hills, topography and high backstops can significantly influence range

9

design – especially the size of the danger area. Many ranges are built with their direction of fire into an imposing hill, or other topographic feature, or into an unusually high constructed backstop. The sheer size and positioning of these features can contribute to a reduced or no danger area range.

Danger Area Templates and Danger Area Traces

Danger area templates are drawings that represent the ground area designed to contain overshoot bullets and ricochets generated from a single shooter's firing point (under conditions representative of normal range use). Each template must show the parameters (e.g. caliber and bullet design etc.) for which it was designed.

Each ammunition or range danger area template should also show the air danger height.

The danger area template for each shooting discipline can be obtained from the respective national shooting organisation.

Danger Area Design Criteria

Danger areas are designed to provide an area large enough to contain all projectiles fired on a range complex, within the level of probability determined by current best practice. The 'danger area' extends far enough to encompass the entire flight of a projectile without danger to any person, building, road or activity in that area.

The dimensions and shape of the danger area(s) are produced using test data. Danger area design is dependent on a number of factors including the external ballistic characteristics of the ammunition; bullet design; range construction (site and design); the planned shooting activities (shooting discipline) and the cone of fire for that shooting activity. It is also dependent on the management of these activities (Range Standing Orders and range supervision).

The development of a cone of fire (as opposed to acceptance of an existing cone of fire that may be considerably larger than necessary) provides much greater flexibility to the design, construction and use of ranges.

Cone of Fire

(taken from: Ordnance Board Proceeding P125(1) - *Small Arms Range Safety Hazard Levels and Principles for Determining Small Arms Weapon and Range Danger Areas - Pillar Proceeding*, dated 7 Jul 98)

The cone of fire is intended to contain, in the vertical and horizontal planes, fired projectiles that are to be allowed for in range design. It includes an allowance for acceptable firearm deviation, which is represented by 5 Standard Deviations and an additional margin for firearm deviation that is considered unacceptable. The allowance made within the cone of fire for unacceptable firearm deviation is not a scientific prediction but reflects a desire by the user to mitigate as much of the unacceptable deviation as is practicable.

Acceptable Firearm Deviation

Acceptable firearm deviation is one which has been identified, quantified and subsequently allowed for procedurally or through the design, construction or layout of a range. Such deviations can be considered tolerable within a risk assessment and result from:

- a. **Firearm System Error.** Firearm system error is the acceptable margin of deviation from the intended point of impact for shots competently fired through a zeroed small arms firearm. The deviation is caused by errors associated with the firer and the manufacturing tolerances associated with the firearm and ammunition.
- b. **Predicted Firing Error.** Predicted firing error is the acceptable margin of deviation from the intended point of impact associated with competently fired shots with predictable yet unintentional aiming errors. Such error assumes a serviceable and correctly prepared small arms firearm, a satisfactory level of training and competence, and the application of range discipline.

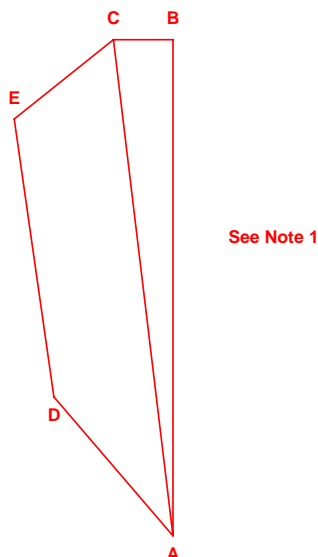
Unacceptable Firearm Deviation

An unacceptable firearm deviation is one that is not allowed for in range design or firing procedures and may result in levels of hazard that are intolerable and which must be reduced to a level as low as is reasonable practicable. It is normally the result of a shot fired unintentionally or in contravention of range standing orders. Collectively, single shots fired with an unacceptable deviation are a small proportion of total shots fired. Unacceptable firearm deviation may result from:

- a. **Misdirected Firing Error.** Misdirected firing error is the deviation from the point of intended impact associated with competently fired yet misdirected shots.
- b. **Random Firing Error.** Random firing error results from single shots that are unintentionally fired with significant random deviation from the point of intended impact, but which are aligned about the general axis of the range by virtue of range discipline.
- c. **Wild Firing Error.** Wild firing error results from single shots that may be deliberately aimed or unintentionally fired in gross contravention of range discipline and which may impact anywhere inside the total energy area of the ammunition.

Designing an Ammunition Danger Area Template

Ammunition and Range Danger Area Templates vary significantly depending on the country of origin. To avoid conflicting standards within NZ, which may lead to unsafe practices, the following is adopted as the standard for the design of an ammunition danger area template (deterministic method as opposed to probabilistic method):



Line A – B. Line A – B is a straight line between the firearm and the target, which has been extended to reach the maximum length of the ammunition danger area template. The maximum length of the ammunition danger area template is either:

- a. The maximum possible range of the projectile.
- b. The maximum possible range of the projectile with a quadrant elevation imposed, so long as this range is not shorter than the maximum ricochet range (see Note 2).

Line A – C. Line A – C is the cone of fire angle applied to Line A – B. Line A – C is the same length as Line A - B. The angle between Line A – B and Line A - C will vary depending on the cone of fire applied.

Line A – D. Line A – D is the opening ricochet angle and, unless empirical data exists to the contrary, it is always to be at an angle of 30 degrees (530 mils) to Line A – C.

Line C – E. Line C – E is the closing ricochet angle and, unless empirical data exists to the contrary, it is always to be at an angle of 45 degrees (800 mils) to Line A – C.

Line E – D. Line E – D is the ricochet boundary. Line E – D is to be one eighth of the maximum ricochet range from, and parallel to, Line A – C for ground targets (see Note

3). Line E – D is to be one quarter of the maximum ricochet range from, and parallel to, Line A – C for hard targets (see Note 4).

Notes:

1. **Completion of the Ammunition Danger Area Template.** Lines A – C, B – C, A – D, C – E and D – E are mirrored to the right of Line A – B to complete the ammunition danger area template.
2. **Maximum Ricochet Range.** Maximum ricochet range is the range corresponding to the angle of descent, which produces the critical angle if impact. For small arms ammunition, the critical angle of impact is considered to be 30degrees (530mils).
3. **Ground Target.** Ground targets, which are also known as soft targets, are all surfaces that will deform or break up when impacted at low angle.
4. **Hard Target.** Hard target refers to all material that possesses sufficient strength and surface hardness that suffer little or no deformity when impacted at low angle, in relation to a specific ammunition type.

Applying Danger Area Templates

As a start point a design plan, drawn-to-scale, is prepared for the range being developed or assessed. This includes the proposed firing points, firing areas, backstop(s), buildings and property boundaries.

Danger area templates can then be applied to the design plan. They are applied to all the firing point(s), parallel to the direction of fire. Outside boundary lines are traced from the template onto the plan or map. The resulting danger area 'trace' defines the maximum boundary of the range danger area, with nothing in place to reduce or eliminate this.

If an arc of fire (e.g. engaging divergent multiple targets from a single firing point) is planned, the danger area template is applied to all possible firing point-to-target combinations. The entire area that encloses the resulting danger area traces is the required danger area.

If a firing area is being assessed, perhaps for the purposes of a field firing range – where a shooter moves forward or laterally a significant distance – the danger area template is applied to the outside edges of the firing area in the direction(s) of fire. The resulting danger area traces mark the boundaries of the danger area, with nothing in place to reduce or eliminate this.

Range operators must beware the temptation of making the danger area 'fit' the land available to them, without any construction taking place to enable this.

Ricochet Air Danger Heights

Associated with outdoor ranges are safety considerations related to the height that

ricochets will fly above the range. These ricochet Air Danger Heights (ADH) can be significant.

The issue of ADHs becomes most relevant when ranges are located in proximity to airports, and for the reduction of a range danger area using vertical danger height dispensation.

Backsplash

Backsplash is defined as fragmented bullet or target materials, or ground debris, thrown back towards the shooter as a result of bullet (or projectile) impact.

To protect shooters from hazardous backsplash shooting organisations are responsible for developing and recommending minimum firing distances between shooter and target as part of any shooting discipline or activity, and the protective clothing to be worn if shooting takes place within the minimum firing distances.

Sight and hearing – eye and ear protection

Shooters, range officers and spectators in close proximity to the range must wear impact resistant eye protection and ear protection to New Zealand Standards at all times when shooting is taking place at a range.

Human Activity Inside a Range Danger Area - Managing the risk

The range danger area is the space within which there may be a risk to people, equipment or property from the firing of authorized firearms and ammunition on a specified bearing or within a specified arc of fire.

Comment [J3]: The term 'human activity' is used in the heading and the first paragraph. I have omitted the word 'human' in subsequent paragraphs.

The range must cease operations if any human activity in the danger area occurs.

Where the range danger area is one in which human activity takes place (such as on a farm, forestry block or large open area) the Range Operator must ensure that no human activity occurs within the danger zone when the range is in operation (see 'Ownership/control of the Range and Danger Area' above).

The range perimeter warning signs serve to attract the attention of people in the area (e.g. hunters) who could unknowingly cross onto the range and into a range danger area.

5. Range and Danger Area Signs

Range and danger area signage is required for all ranges. Signs need to be of durable construction to resist weathering. The signs warn people approaching the site of the presence of a shooting range, the range danger area and the dangers of entering it.

International safety signage standards (pictorial and wording) apply to safety signage on ranges.

Main Facility Sign

The range facility's main sign needs to be large and clearly visible. It should be located at a commonly used access point (e.g. main gate area or entranceway) and clearly identify the site as a shooting range. It should contain, as a minimum, the range facility name, Range Operator contact information (e.g. phone number or P.O. Box etc.) and a warning that the person is entering a shooting range.

Perimeter Signs

The perimeters of the range are defined as the boundaries that enclose the active range area and the danger area.

The perimeters of all range(s) need to be identified with warning signs. These signs are intended to alert people as to the existence of the range and the range danger area boundaries. Signs need to face outwards away from the range(s).

They instruct unauthorized persons not to enter the area.

The perimeter signs must not be obscured by brush or tree growth. Growth that obscures the signs must be cleared away. The signs need to be always visible, being replaced or repaired as necessary.

The Range Operator needs to check regularly, and certainly annually to ensure that all perimeter warning signs are in good order.

Shooting organisations have developed standard signage for the use of range operators.

As well as perimeter signs, ranges fly a warning flag when in operation.

6. Range Flags – All Outdoor Ranges

Each range on a facility must fly a large **RED or ORANGE** (including the option of fluorescent) range warning flag when in use. The flag of such size and condition as to stand out and be clearly visible is flown from a flagstaff approximately 6 m tall.

This flagstaff needs to be located in a conspicuous position, clearly visible to those approaching the range. Its location is dependent on the facility design and construction.

The flagstaff must not be placed in a location that poses a hazard to anyone operating the flags – e.g. not atop a backstop where, due to the presence of an adjacent range, the flag operator would be exposed to fire from that range. The flagstaff should not be located on a steep slope or in any other hazardous location.

The range flag is raised when the range is opened and lowered when closed for the day. When the range is not in use, no flag is flown from this flagstaff.

Gallery, skeet, trapshooting, sporting clay and field ranges use a system of red and green signal flags and/or light systems. Shooting organisations can supply details of the correct operation of these.

Depending on the design of the range, a range flag may be required for each range where the range is part of a larger range complex. This may extend to each bay where multiple shooting bays form part of the range. This clearly identifies which ranges and/or bay is in use at any given time.

Wind Flags

The location of any wind flags used on a range must not interfere with shooters; or obscure the view of the active range area from the shooters or Range Officer.

Wind indicators must be of different shape and colour to all warning or range control flags in use on the range. (This is to avoid confusion over their meaning.)

7. Firing Points & Firing Lines

Firing points are the specific locations from which individual shooters engage their targets. They are intended to control the location from which shooters fire and help to direct their firing.

A firing line is a group of individual firing points with a common attribute (e.g. distance to the targets).

Firing Point Spacing

Firing point spacing is the measured distance centre-to-centre between adjacent firing points.

The spacing of firing points along the firing line must be large enough that:

- Shooters do not interfere with each other during firing (distract, hit by ejected cases, smoke, noise);
- The Range Officers can conduct their duties (e.g. supervise shooters, clear firearms, and assist shooters as needed).

Firing point spacing must not be so large that the Range Officer cannot maintain adequate control of the firing line.

Having the correct firing point spacing for the intended range use will minimize shooter errors (e.g. cross-firing) while promoting the optimum and safe use of range facilities.

Firing Line Height (Elevation)

When practical and depending on the range design and its intended use the firing lines can be elevated above the range floor. This elevation keeps the individual firing points dry and improves visibility of the target area.

Elevated firing lines must be constructed to provide for the safe movement of shooters onto and off of them.

Elevating the firing point may also have the effect of removing the range floor from the cone of fire (a similar effect to sloping the floor toward the target area).

If a number of elevated firing points are provided on one range, care must be taken to ensure that firing points positioned in front of other firing points do not interfere with the shooters line of sight or create an unacceptable ricochet hazard.

Firing Line Depth

Firing line depth is the distance measured from the front edge of the firing line to the rear edge of the firing line.

Each firing line must be deep enough to accommodate the shooters, their equipment, and provide space for the Range Officer (or Range Officials) to function behind them without any impediments.

There are competition regulations from various shooting organizations that have minimum firing line depth requirements.

Covered Firing Line

The firing line may be covered with a weather shelter. The height and construction must not interfere with the shooters or the Range Officer during any part of their activities on the firing line (e.g. preparation, firing, supervision etc.).

The firing point cover must not obscure the view of the active range area from the shooters or the Range Officers.

8. Range Floor

The floor of a range is defined as the space between the firing line(s) and the most distant target line.

The range floor is an important consideration in the design and development of the range.

9. Backstops

Backstops are designed to capture as many fired bullets and low flight ricochets as possible.

A backstop may be constructed to such height and thickness that it captures all bullets and ricochets. Such would be the case in a no or reduced danger area range.

A backstop consists of a raised mound of earth, or a suitable natural feature, behind the target(s). The design and construction of the backstop must meet best practice standards established to promote bullet capture.

Grass, shrubs and trees do not augment the height of a backstop.

The forward (impact) face of the backstop should be of such design that it does not induce ricochet. It must be covered by a layer of material of sufficient density so as to absorb and retain any rounds.

Bullet Catchers

Bullet catchers serve as the primary bullet impact area and may be built as part of a backstop immediately behind the targets.

Bullet catchers:

- ❑ Minimize degradation (e.g. loss of slope) of the backstop due to bullet impacts;
- ❑ Ease the backstop maintenance that is required periodically (e.g. reshaping of the backstop face when bullet tunneling starts to occur);
- ❑ Ease the de-mining of lead and copper alloys from the backstop.
- ❑ Must be constructed so that they do not induce a ricochet.

10. Berms & Side walls

Berms and side walls are intended to:

- ❑ Prevent movement of people/animals onto the active range area;
- ❑ Reduce the likelihood of an errant shot, backsplash and splatter escaping the active range area;
- ❑ Separate adjacent ranges and protect people in areas adjacent to the range;
- ❑ Protect buildings or equipment (e.g. a target shed).

Berms and side walls are not designed to serve as backstops, unless constructed as such.

As a general guide berms and sidewalls:

- ❑ Are of sufficient height so as to achieve their purpose;
- ❑ Are of such design as not to induce ricochet;
- ❑ Join to at least one backstop;
- ❑ Are continuous (without gaps).

If tyres are used to construct berms or side walls, they need to be:

- ❑ Such that they absorb projectiles (and to not cause them to 'bounce' off);
- ❑ Arranged in columns;
- ❑ Staggered and overlapped to provide uniform, gap-free coverage;
- ❑ Filled with soil or sand;
- ❑ Securely supported and configured to prevent toppling, sagging or leaning;
- ❑ Such that they do not present a health hazard (for example, breeding ground for insects in water trapped in the tyres).

The need for and placement of berms and sidewalls needs to be carefully considered. In some circumstances berms and sidewalls are not necessary and are better done without (e.g. where they conceal likely approaches to the range danger area).

11. Closing a range

Where a range does not meet current best practice, or where the range is considered unsafe, the range must be closed.

Any individual who considers a range unsafe should cease use of the range and report this to the range operator.

If confirmed as unsafe the range must be closed and signage posted to this effect. Once closed it is the responsibility of the range operator to ensure the range is safe before making it available for shooting.

Where the range operator fails to close the range this should be reported to the New Zealand Police.

Where a pistol range is considered unsafe this is to be reported to the Manager: Licensing and Vetting, NZ Police, PO Box 3017, Wellington.

Any person using a range that has been closed for target shooting may commit an offence against sections 48 and 53 of the Arms Act 1983.

A range operator who fails to ensure that a range is safe may commit an offence against section 145 of the Crimes Act 1961.