Steyning Rifle Range:
History and Record of Existing Features

Compiled on behalf of the Steyning Downland Scheme
Justin Russell, February 2017

Steyning Rifle Range:
History and Record of Existing Features

Compiled on behalf of the Steyning Downland Scheme
Justin Russell, February 2017

justin.russell@ucl.ac.uk

oskrpt 001

CONTENTS

FIGURES

APPENDICES (not available in download – please contact author for details)

1.0 Introduction and acknowledgements

1.1 This report has been created on behalf of the Steyning Downland Scheme and Wiston Estate, as a general introduction to the history of the site as a rifle range. It is by no means a complete history. The record of remaining features relating to that period of use is intended as a basis for the first stage in a potential programme of conservation and preservation.

1.2 The site lies approximately 500m west of Mouse Lane, (TQ16580,11270). It is located beside a spring in the valley between Pepperscombe Farm and Sussex Barn (figure 1).

1.3 The site survey was conducted over two days in September 2016: one day for the GPS survey of the site and one for the detailed recording of features. The bulk of the report is made up of cartographic/photographic analysis and the site survey.

1.4 The following people have contributed a great deal to this report and a huge debt of gratitude is extended to them:

- Bill Flentje and David Harding, for sharing their formidable knowledge of rifle ranges and rifle practice, on very many occasions.
- Chris Tod, curator of the Steyning Museum, for providing access to the museum archives and kindly allowing many images to be reproduced here.
- Steve Handerer, range warden in the 1980s, for the excellent photographs and information relating to the range in the last years of use.
- Gilbert Saunders, of the Partridge Green Home Guard, for the vivid recollections of the site in the Second World War.
- Steve Knowles, of the Whitgift School Shooting Team, for the fantastic detail relating to the site in the 1960s.
- John Cook (Archaeology South-East) for the GPS and Total Station survey of the site, providing a valuable framework with which to locate the detailed drawings.
- Diccon Hart for editing the report.
- Matthew Thomas, Bryony Webb and the Steyning Downland Scheme, for continued support and for providing the impetus to compile the following document.
- The Wiston estate for allowing continued access the rifle range.

2.0 Origins of the rifle range

2.1 In the mid 19th Century, British authorities had serious cause for concern that the defence of the country was being compromised. The Crimean War (1853-1856) had seen large numbers of soldiers and vast quantities of equipment tied up in a protracted and distant engagement, leaving only a relatively small reserve back in Britain. Should a similarly far flung conflict once again arise, the notion of home defence needed to be addressed and, to this end, a 'stay behind' force was to be created. The Rifle Volunteer movement of 1859 was one of the measures put in place to counter any potential invasion threat. The basic concept was that civilians would become part time soldiers, training for one month a year, in musketry, drill and other military procedures, to become an effective fighting force.

2.2 There were various forms of civilian army prior to this: the militia, yeomanry and the Napoleonic era volunteers. The creation of the Rifle Volunteers, however, was an attempt to have a more modern and autonomous organisation, grouped by county with the aim of recruiting middle class working men who could afford the entry subscription and cost of uniforms. The creation of the Volunteers came just eight years after the introduction of the first universally accepted rifle into the British army – the P51, soon replaced by the P53. The main difference between the P53 and the muskets that preceded it, was the ability to fire a pointed projectile, which engaged with 'rifling' in the barrel of the weapon (grooves scored on the interior, twisting from trigger to muzzle) and was thus rotated in flight. The rotation of the bullet gave it greater accuracy and range meaning that rifle practice now required a larger area for safe conduct. The accurate range (meaning here the ability to hit a target) of the P53 bullet was now in excess of 1000 yards (914m), a huge increase over the musket ball, the maximum of which was no more than 200 yards (182m). For this reason, the barracks that was located in Steyning between 1800 and 1813 did not have a permanent range to practice musketry and instead would have needed only temporary targets in a field of not more than 200 yards in length.

2.3 On the 20th June 1859 a meeting was held in the White Horse on the subject of forming a rifle corps in Steyning. The meeting was thinly attended. Although this was blamed on poor advertising of the event, a month later an adjourned meeting was still attended by only thirty people. Yet despite such initial apathy, in May 1860 the 18th Sussex Rifle Volunteers came into existence, with their administrative centre at Henfield. One condition of all Volunteer corps gaining official recognition was that a suitable area for rifle practice should be provided (*Riflemen Form: A Study of the Rifle Volunteer Movement 1859-1908)* and it so happened that the valley at the foot of the South Downs, west of Mouse Lane, was ideal for this purpose. Figure 2 shows the location of rifle ranges relating to the 18 Rifle Volunteer Corps within Sussex. Though the list of Sussex Corps runs to 20, the 3rd position was never allocated, and the 20th Billingshurst Corps were disbanded not long after formation; it is unlikely they ever got as far as constructing a rifle range. The Cinque Ports Rifle Volunteers, while largely focused in Kent also had Corps with ranges in Sussex at Etchingham, Hastings, Rye and Winchelsea, but these are not shown on figure 2.

3.0 Historic background

3.1 The first map on which the range is known to appear is the 1875 first edition 25 inch Ordnance Survey map, labelled clearly as 'Volunteer Rifle Range' (figure 3). The target, marked as 'Butt,' is situated on the slope at the head of the valley in a linear clearing amongst the trees. At this time, a target consisted of thick sheets of iron six feet (1.8m) high and two feet (0.6m) wide, bolted together. The Sheets had a grid etched into their surface which was painted white, a circle and bulls eye at the centre (*Rifle Ammunition, Notes on the Manufactures Connected Therewith, As Conducted in the Royal Arsenal, Woolwich)*. The soft lead bullets striking the surface would 'splash' against it, leaving a mark in the paint, enabling a marker to assess the shot.

3.2 To protect the marker from the rifle fire while still allowing him to see the target, he would be screened by a Mantlet, often a trench with an earth embankment off to one side of the target or a metal box, constructed of similar thick iron sheets as the targets (*Regulations for Conducting the Musketry Instruction of the Army, 1859* and *Regulations for Musketry Instruction, 1889)*. The 1875 map shows the mantlet (labelled here as 'Mantelet') as a square, 13.5m (15 yards) to the south-east of the butt, and it is likely this was one of the iron box types. The accuracy of each shot was indicated by a system of flags raised from the mantlet, white for a hit on the exterior edge of the target, blue for hits within the main target circle and red for a bull's-eye. The firing positions started at 100 yards and continued at every 50 yards to the 600 yard firing position. With just one target available, only one person would be able fire at a time.

3.3 By the time of the 1897 second edition 25 inch map (figure 4), the range had been redesigned. The targets (notably in the plural on this map, presumably indicating two targets) now sit 100 yards further east and the linear clearing in the trees is now solely for use as the stop butt (bullet impact area). This area appears to have been landscaped at this stage to form three terraced platforms, stepping up in elevation 30m, 50m and 63m west from the targets, each associated with a steep 'ramp' at the western end. The reason for this landscaping is to prevent bullets which have passed through the targets (now made of canvas) from ricocheting off the naturally sloped ground and to impact safely into the steeper ramps.

3.4 The length of the range has also been extended by this time to accommodate 8 firing positions, the 800 yard point being located in the corner of the field to the right of the track from Mouse Lane. This track and the hedge on the northern side are not marked on the 1st or 2nd edition maps, so while the track may have existed it was presumably an informal affair. So informal, perhaps, that the 800 yard firing position was located on a spot now occupied by the modern track. A small building and yard 8m to the north of this firing position is also shown and its proximity to the rear of the furthest range feature would suggest it was a range store, probably with workshop facilities. The 600 and 700 yard firing positions appear to be located fully in the field to the north of the modern track. The remaining firing positions, from 500 yards down to 100 yards, are now only shown at 100 yard intervals, with the intervening 50 yard positions removed.

3.5 The publication of the 1897 map came at an important time for the Volunteers – the adoption of the Lee Metford Rifle. When raised, the 18th Sussex were issued with the P53 Enfield, a muzzle loading rifle of .577 inch calibre. By 1870, this had been replaced by the Snider rifle, essentially an Enfield rifle converted to allow breech loading of lead bullets incorporated into a cartridge – this is the rifle

in use at the time of the 1st edition 25 inch map. In 1885, the Volunteers (now L company of the 2nd Battalion Royal Sussex Regiment) were armed with the latest rifle in the British army, the Martini Henry, firing a .450 inch lead bullet (the Volunteers, however, were typically allotted their new weapons some 5 years after the regular army received theirs). The Lee Metford, in 1897 brought the Volunteers into the modern age, firing the .303 bullet, which saw service in various forms up until the 1950s. This high powered rifle had a range of over 1000 yards and as a result many ranges were extended to compensate or closed if there was no room for expansion. The record of the 4th Battalion Royal Sussex Regiment notes that Cuckfield, Lindfield, Horsham and Chichester ranges were closed at this time as they were unable to accommodate the extension to firing positions and increased danger area.

3.6 The targets on the 1897 map are, at this stage, canvas over wooden frames: a new format to accommodate a new bullet - the .303 bullet, made up of a lead core surrounded by a brass jacket. On impact with an iron target these bullets would not 'splash' like their fully lead predecessors, but more than likely ricochet off in any direction. With ricochets recorded up to 1000 yards, this would mean that people at any of the firing positions would themselves be in danger. A wooden target, with canvas stretched between, does not present the opportunity for the bullet to ricochet, merely pass through and impact in the area behind the target. There is nothing shown on the map to indicate how marking was conducted at this date.

3.7 In the 1905 edition of the Kelly's Directory, a reference is made to the Armoury of the 2nd Volunteer Battalion at Windsor Cottage, on the eastern end of Mouse Lane. One can only assume this was the store of ammunition for the range, perhaps the secure lock up of rifles for the Steyning branch of the 2nd Volunteer Battalion.

3.8 In 1908 the Rifle Volunteers were totally overhauled and renamed the Territorial Force. The volunteers in Sussex were now part of the 4th Battalion Royal Sussex Regiment and looked and trained very much more like the regular soldier. The 1911 25 inch map (figure 5), drawn when the Territorial Force was only three years old, differs subtly to the map of 14 years previously. The main difference is the reduction in range from 800 yards to a maximum 600 yards and the removal of the 100 yard firing position in preference to one at 150 yards. Perhaps the most important change is that the target area now shows the presence of a small bank in front of the targets, sloping down towards the firing positions. This can only imply that marking was now catered for at the targets, the bank providing a mantlet for protection of the markers - the size of the area would imply this is still a two target range only.

3.9 Also notable are three flagstaffs, two located on the brow of the slopes either side of the targets and one 340m west of the targets, on top of the ridge overlooking the range (the latter only shown on figure 22). Red flags raised from these would have been the main warning to locals that the range was in use, and that access was forbidden.

3.10 From the creation of the Volunteers until 1900 there had been no opportunities to put their training into practice. During the Second Boer War, however, Volunteers were given the chance to fight alongside the army in South Africa. During the First World War, the same demand for huge numbers of soldiers gave the Territorial Force the chance to opt to fight abroad rather than function in a purely defensive role in the British Isles. Huge numbers left to serve in

oversea, but a core did remain, and use of the range would have continued in this time. Because of the depletion of the part time army created to assist in the event of an invasion, the Volunteer Training Corps came into being, made up of men in exempted professions, or more frequently, those too old to join the army. Notoriously under-equipped, it wasn't until 1917 that rifles began to be issued in large numbers and it is possible that men of the VTC trained at Steyning alongside the Territorials.

3.11 The 1932 25 inch map (figure 6) shows very little change to the layout. The 100 yard firing position has been reinstated and a building is shown to the north of the target area. At 5m by 2.5 m it would appear a small target store appended to the markers' gallery, itself only 5m in length.

3.12 With the Second World War the rifle range leapt from light use, by the Territorials and civilian rifle clubs, to heavy use by the military. Unlike the army training camps of the First World War, which were large and self-contained (Shoreham Camp, for example had four rifle ranges within its boundary), in the 1940s, soldiers were often billeted in smaller dispersed groups and driven to ranges in the area. The army had priority use of the range in this period on weekdays, while at weekends it was open for use by the Home Guard (Gilbert Saunders *pers.comm.*). This drastic scaling up of use meant that the range had to be redesigned to modern specifications. Aerial photographs from 1945 of the area (not reproduced) show heavy wear in the target area and firing positions, but the resolution is too low to show specific details.

3.13 A photograph taken in April 1946 (figure 7) confirms that the disturbance in the target area is indeed a rebuild – the range had been upgraded from two to eight targets, radically increasing the simultaneous training of soldiers. The stop butt shows signs of the stepped composition of previous mapping but also with linear striations within these. The markers' gallery and mantlet bank are clearly visible, so too is the target store at the southern limit of the gallery.

3.14 The firing positions at 100, 200 and 300 yards have been turned into earthworks of between 15 and 20 m in length. In front of these on the western side, the image reveals some white linear features that appear to be vertical revetments for the banks. The 400 yard position is not visible at all, suggesting it had fallen out of use and this corresponds with the 1945 War Supplement document (*Small Arms Training, Volume V, War Supplement, Small Arms Ranges: Layout, Safety and Equipment*), which states there is no longer a requirement for firing positions at 400 yards. The 500 yard position is shown as a raised rectangular platform. The track from Mouse Lane has become a permanent fixture at this stage, appearing to be fairly newly constructed, with a turning circle at the far end, just to the south of the 500 yard position. A building is visible to the south of the turning circle. The boundary with the field to the north of the access track is demarcated at this time only by the change from cultivation to grassland.

3.15 Almost directly north of the 500 yard position, is a building, set within a 50 by 50 yards square area of differential vegetation, which is not located on any of the Ordnance Survey maps. Its presence only in the war and immediate aftermath (the last aerial photograph showing it dates from 1947) give a clue as to its function. Gilbert Saunders, who served with the Partridge Green Home Guard, confirms this as the location of a gas training building. As part of their military education, of which rifle target practice was just one element, the Home guard were drilled in the use of respirators and gas warfare. 'Gas' (smoke or tear gas) would be pumped into the building, men would enter with respirators fixed and

some form of exercise might then proceed to take place – running on the spot or jumping, to simulate the effects of gas and smoke under battle conditions. For the remaining few seconds in the chamber, respirators were removed and the full effect of the toxin was experienced as it was inhaled into their lungs. Their training over, the men would recover on the grass outside as others within their platoon went in for their turn. On the 14th May 1944 Gilbert was training here with his platoon of Home Guard when the accidental shelling of Steyning, by artillery on the Downs, took place. A shell fell amongst the Home Guard and killed one of their party (see Appendix 4).

3.16 The 1946 aerial photograph also shows activity to the north of the track from Mouse Lane, near the old 800 yard firing position, suggesting five or six temporary structures, perhaps tents which may have served as the welfare facilities and administration for the range in the war period.

3.17 The first map of the area produced after the war, the 1947 6 inch (figure 8), shows the range not as it stood at that time, but as it was in 1911, when surveyed for the 3rd edition 25 inch map. The rebuilt and enlarged markers gallery is not shown and the firing positions extend out to 600 yards. Whatever the cause of the error, it is continued in maps of the area for another twenty years. The only updated feature shown on the 1947 map is the new track from Mouse Lane and the turning circle at its terminus.

3.18 In 1950 it seems the range was almost closed by the military authorities, as part of the post-war scaling down of activity. Ranges at Arundel, Battle, Cocking, Welcombe Bottom and Steyning or Kithurst were earmarked for closure, but ultimately both Steyning and Kithurst were retained (Sussex County Rifle Association).

3.19 The 1959 aerial photograph (figure 9) shows the range development has once again stabilized and remains frozen in the wartime format, which continues with the 1971 Ordnance Survey map (figure 10) and the 1975 aerial photograph (figure 11). The 1971 Ordnance Survey map is notable, however for the fact that the details of the markers' gallery are shown for the first time since their construction some thirty years previously. The number of flagstaffs have been increased from three to five – one at the terminus of the track from Mouse Lane, two in similar locations to the lateral positions shown on the 1911 map, one to the north-west of the targets and the fifth some 570m west of the targets replacing the one above the target area (the latter two are shown on figure 22).

3.20 The military had left the site at this point however, as a discussion in the House of Commons on the closure of full bore ranges in 1969 reveals. Fifty-two rifle ranges around the UK are listed as having been closed in the previous four years to Army Cadet Forces, though Steyning is one of fifteen to be retained for use by schools and rifle associations.

3.21 The raised firing position at 500 yards can clearly be seen on the 1975 aerial photograph, but the turning circle is fading from view and trees are encroaching on the site from all sides. At some point in the late 1970s the range fell into disuse and though the lease to use the land was still open the site began to become overgrown.

3.22 In the early 1980s and group of local enthusiast shooters from the Adur Valley Gun Club cleaned up the site, chopped down young trees in the stop butt, painted the target frames and rebuilt the 500 yard firing position (amongst many

other things). The site was rented out by a variety of groups, from cadets, rifle clubs, the Police and the Southern Counties branch of the Muzzle Loaders Association of Great Britain. Figure 12 shows the site as it currently appears (Google Earth, September 2015).

3.23 The range was finally closed in 1989, after failing to meet the safety standards of the day. At its inception, the Crimean War was still fresh in peoples' memory - the First and Second World Wars, the Korean War and the Falklands War all passed by with the range still functioning in its intended role and while the Cold War was coming to a close, the last shot was fired on the site, ending 129 years of near constant use.

4.0 Description of the existing rifle range

4.1 Stop butt

4.1.1 The South Downs is home to a number of disused rifle ranges, the characteristic dry valleys of the area providing a number of ready-made safety features. All rifle ranges require a stop butt of some sort, an area into which bullets that have passed through, or missed, the targets can impact safely. The head of many dry valleys in the South Downs provided this facility. Steyning is no exception and the head of the valley, where the slope rises steeply, has performed this role from the outset.

4.1.2 As seen on the 1875 Ordnance Survey map, the early target was set further west, into the slope, before being re-sited by the time of the subsequent map of 1897. The only surviving feature of the early range is slight artificial steepening of the natural slope, shown on figures 13 and 14, in which there is a shallow hollow area at the northern end – the site of the targets on the 1875 map. The target itself, along with the mantlet for the marker, would have been removed when the site was upgraded; they would have presented a serious ricochet risk if left *in situ*. The two photographs on figure 14 show an iron target and mantlet from a rifle range at Preston Hills, Kent. The mantlet is brick, rather than iron, and situated on the opposite side of the target to that at Steyning. Despite this, however, the photographs give a good idea of the general layout of an early target area.

4.1.3 A series of seven linear banks and six trenches (measuring 33m east to west), bisected by two cross trenches (measuring 23m north to south) currently occupy the space of the stop butt of the range from the 1897 period of mapping onwards. The banks are situated above the natural floor of the valley and the trenches are excavated to a depth close to that of the valley floor - the cross trenches, however, appear to be cut into the valley floor. All of these features are visible on the 1946 aerial photograph, looking freshly formed and may well date from this period.

4.1.4 The banks and trenches are not found in any of the official publications relating to rifle range construction and it is possible that they are simply the result of repeated bullet impacts, cutting the trench and throwing up soil to each side to form a bank. This is certainly the most popular view and other ranges in the UK have exhibited similar phenomena (Bill Flentje *pers. comm*.). Although this explanation would seem to adequately account for the features there are three factors that also need to be taken into consideration. Firstly, although six of the trenches sit directly behind targets there are no trenches associated with the two most northerly targets (targets 7 and 8). This might be explained by these two targets being used on a less frequent basis or perhaps chalk rubble, having eroded out of the steep valley slope, has obscured any original trenches. Secondly, the formation of banks are in some instances extremely regular, especially the southern most examples – they show an equal batter on each side and have particularly flat tops, rather than rounded or uneven tops that one might expect from impact-scattered soil. Finally, the two cross trenches cannot be accounted for by the impact process – they would inevitably have been filled by the same events that formed the banks and their very existence alludes to some kind of design.

4.1.5 In all likelihood the banks and trenches are formed from a combination of bullet scouring and design – neither explanation fully resolves the mystery of the placement of this feature. By all accounts, a shallow sloping stop butt such as the one at Steyning is not ideal for preventing ricochets and the common practice would have been to create steeper ramps within this, as the 1897 OS map suggests. As a general housekeeping practice, bullet scoured trenches should be removed to keep the impact area uniform – at Steyning the opposite occurred and the trenches and associated banks, however they were formed, seem to have been positively encouraged and maintained.

4.1.6 Approximately seven areas of modern disturbance were identified in the area, in the form of pits and related spoil deposition, relating to fire pits and mountain biking activities.

4.2 Markers' gallery

4.2.1 A gently sloping area of 25m separates the trench and bank system with the markers' gallery and targets. The markers' gallery itself is orientated approximately north to south, with a length of 37m and a breadth of 3m, built to accommodate eight targets (figure 15). It is partially dug into the valley floor, with the upcast soil forming the mantlet (earth bank) situated between it and the firing positions. It is composed of a concrete floor, onto which a retaining wall of brick has been built, measuring 0.45m thick at its base and 2.2m in height. The exposed top of the wall is constructed with a stepped appearance in section (the steps facing the direction of firing) – an anti-ricochet device commonly found in pillbox embrasures.

4.2.2 The roof of the gallery is made of 150mm of concrete, poured onto corrugated and galvanized iron sheets (48 panels with the makers name 'Discus' still visible printed on some), supported by sixteen iron brackets. Soil from the mantlet is spread over the concrete roof to form an upper covering. There are four types of bracket, grouped together in fours. Three types (types 1 – 3) are variations of the same format - two strips of iron joined at almost 90 degrees, strengthened by a curved bracing strip of iron, while the fourth, at the northern end of the gallery (type 4) is a rather more basic design of three strips of angle iron bolted together to from a triangle. A series of bolts protruding from the wall, 120mm to the side and 100mm above all of the existing brackets indicate that the brackets and roof were originally located in a position c. 100mm higher than their current level (figure 16).

4.2.3 From two official military manuals that cover rifle range construction 'Small Arms Training Volume V', 1931 and Infantry Training Volume III', 1958 it can be seen that the lowering of the roof reflects changes in standard safety procedure over this period. In the 1931 manual the section through a markers' gallery of normal (or 'classification' type) ranges shows brackets supporting a corrugated galvanized iron roof, which is flush with the top of the retaining wall (figure 17). The 1958 manual, however, depicts a roof made of three inch concrete, level with the retaining wall and covered in soil. At some point after 1945, the updated precautions required that a concrete roof be added at Steyning and the only way to safely achieve this and have a covering of soil was to lower the roof approximately 100mm. The 1958 manual also recommends that the roof is supported by vertical iron props. Steyning range reused the original brackets rather than adopting the props.

4.2.4 Slots for benches, comprising eight sets of two slots, are cut into the wall in front each target, to provide a bench for each marker to sit on (figure 16). At the base of the retaining wall are eleven 'weep holes', ceramic pipes built into the wall and extending into the earth mantlet, serving to drain excess moisture from the bank. The floor of the galley is graded to slope on a 1 in 30 incline to prevent build-up of liquid in the gallery, which drains into the target trenches. This angle is matched in the roof, though in that instance, it is an anti-ricochet design.

4.2.5 In the 20th Century, communication between the markers and the firers was done by holding up discs on poles in front of the bullet entry hole on the target, so that the firer could assess their accuracy. Telephones were also wired in, for the relay of more complicated and important information. The telephone socket is located between the 5th and 6th target, high up on the retaining wall. The shelf on which the phone was placed is traceable by the drilled holes in the wall to attach the brackets on which the shelf sat. Each firing position would have had a telephone socket, linked in to this phone via a buried cable.

4.2.6 There are eight target frames, numbered here from south to north, each measuring 2.04m in length and 2.56m in height (figure 17). These are known as 'Hythe' target frames after the School of Musketry at Hythe, Kent. Designed to sit entirely behind the mantlet, none of the metal frame is visible at any of the firing positions, hence not liable to be hit by bullets and cause ricochets. Each frame has two carriages, front and rear, into which the wooden targets are slotted. Measuring 4 feet square (or 6 feet, for distant firing positions) the wooden frameworks were covered in canvas and faced with a paper target. The carriages are balanced so that a wooden target framework in the front carriage could be in the up position, ready to be shot at, while the target framework in the rear carriage would be in the down position and be in the process of repair. Alternatively, a carriage could be weighted down, so that its opposite partner is raised or even hooked into the up position by the chain in the centre of each frame.

4.2.7 A thick wound wire is attached to each carriage, looped over the pulley wheel at the top of the target frame and fixed to hook shanks, to assist in the smooth lowering and raising of the targets, aided by wheels on the carriages using the metal frame like a rail. Five of the carriages (targets 3, 4, 6, 7 and 8) are marked with a maker's plate: JEFFRIES SUTTON SURREY ENGLAND. Target frame 7 has a maker's plate: AIMERS MCLEAN + CO LTD. Jeffries frames are mentioned in the 1911 and 1931 manuals (alongside Carey frames) as varieties of the Hythe frame.

4.2.8 A wind strut gives the frame stability and, according to the 1931 Small Arms Training manual, should be embedded in a block of concrete within the slope leading down to the markers' gallery. There are three types of wind strut present, type 1 fixed to target frames 1 and 2, type 2 attached to target frames 3 and 4 and type 3 used with the remaining target frames. Type 1 features a small head with two bolts attaching it to the main frame and a pronounced 'elbow' where the strut changes from horizontal to the angled descent into the concrete fixing block. Type 2 features a small round head, one bolt attaching it the frame and a rounded curve connecting it to the angled piece. Type 3 is characterised by the long head by which it is attached to the frame by two bolts and a curve at the change in angle. The minor variation in frames in the gallery could be down to them having been brought in second hand from another site, rather than purchased as new.

4.2.9 The trench in which the target frames are placed extends 0.5m below the floor level of the markers' gallery and would appear to be constructed with a concrete base and brick walls, capped with concrete (significant accumulation of debris prevented full inspection of the target trenches at the time of the survey). Target frames 1 and 2, 5 and 6, and 7 and 8 sit in shared target trenches while target frames 3 and 4 sit in individual trenches, separated by a concrete capped brick partition. The reason for this is unclear. Two grass mowers, spares from the 1980s revival of the range (Steve Handerer, *pers. comm*.) are wedged within the target trenches, the first mower between target frames 2 and 3, while the second mower is between target frames 4 and 5.

4.3 Target Store

4.3.1 At the south end of the markers' gallery, immediately south of target frame 1, is the target store (figures 14 and 18). At 5m by 3.2m, the structure provided secure storage for the wooden targets and necessary additional materials. It originally featured a heavy steel door (recently reused as a bicycle ramp in the workshop area and now covered in chalk rubble) and one window, facing south. The window and four ventilation holes are now covered by steel plates, but would originally have had offered protected ventilation, possibly wire mesh for the vents and shutters for the window. A steel strip, on the southern entrance wall is all that remains of the original door frame.

4.3.2 A concrete reinforced roof overhangs the brick wall structure by 120mm – on the underside of the overhang, is a drip groove, running around the roof to stop rainwater from the roof running down the walls. Where the roof is visible inside the building, the mould left by the wooden shuttering used when the concrete was wet can clearly be seen. The concrete roof of the target store protrudes slightly over the top of the retaining wall and mantlet (not a desirable situation when the range is being used, as it may represent a ricochet issue), which suggests the top of the mantlet has eroded somewhat over time, exposing the concrete of the target store roof.

4.4 Entrance

4.4.1 Outside the target store a brick lined step raised the floor 220mm, at which level it continues to the entrance. Due to build-up of weathered material and debris the around the entrance, the extent of the concrete floor could not be assessed.

4.4.2 On the top of the wall, above the entrance is a socket for a danger flag pole, to be erected during firing (figure 16). The entrance itself is protected by a wall angled to 60 degrees south-east of the retaining wall, so that no direct fire could access the markers' gallery – it forms the southern end of the mantlet.

4.5 Latrine and workshop

4.5.1 To the south of the entrance is a 9m by 6m concrete platform on which two structures are visible (figure 15). The first is the latrine, built up against the corner formed by the retaining wall (there is, however, no mantlet to retain at this point) and the extreme southern wall of the whole structure. A sloping concrete roof and single skin brick wall form the latrine, which would have housed a receptacle of the Elsan type.

4.5.2 The second structure, of which only the brick footings remain, is the workshop. All wooden targets used on site would be constructed or repaired within the

workshop, which was also provided with a stove to supply heating and hot drinks. The workshop and latrine area are cut into the base of the valley side, requiring a low retaining wall to enclose the area on the southern and western sides.

4.6 100 yard firing position

4.6.1 The first firing position consists of a low bank, 29m in length, up to 3.8m wide at its base and 0.3m in height (figure 19). Constructed to accommodate up to eight people firing at any one time, the 1946 aerial photograph shows this to be only 19m in length, suggesting that the extra 10m on the southern extent was added sometime after this date. The firing position currently shows no sign of the revetment visible on the 1946 aerial photograph and all sides slope gently.

4.7 200 yard firing position

4.7.1 At 33m long, up to 4m wide and 0.3m in height, this is the longest of the firing positions. Comparison with the 1946 aerial image once again shows the wartime length to have been significantly shorter, at only 15m. As with the 100 yard position, no signs of the revetment indicted on the 1946 aerial photograph are now present.

4.7.2 An isolated bank lies 3m to the west of the main bank, (5m in length and 3m wide) and it would appear to be directly related to the 200 yard position, but its role is uncertain. There is a possibility that it represents the two person firing position relating to the 1897, 1911 and 1932 Ordnance Survey maps, being well sited on the firing line depicting the range, albeit some 6m to the west of the location marked on the maps.

4.8 300 yard firing position

4.8.1 Out of the three firing positions in the valley, this is the one that matches best with the 1946 aerial photograph in its dimensions (17m long and 6.5m wide). It is currently difficult to define on its southern edge due to wear from an informal path around the trees surrounding the spring. Four timber lined firing pits are noted to have been dug here in the 1950s, in accordance with range construction of the period (Steve Handerer, *pers. comm*.).

4.9 500 yard firing position

4.9.1 At the time of writing this firing position was heavily overgrown and detailed observations could not be made. The existence of a raised and revetted position at this location is supported by a photograph from the Steyning Museum, showing what appears to be Imperial Sussex Yeomanry posed on top of a plank revetted bank (see appendix 1). The 1946 and 1970 aerial photographs show distinct shadows associated with a vertical side structure. The platform was rebuilt in the early 1980s (Steve Handerer, *pers. comm*.) with telegraph pole revetment instead of the planking seen on the early 20th Century photograph (appendix 1).

4.9.2 The reason for such an elevated position (in comparison with the low banks of the firing positions closer to the targets) can be seen on figure 20, which shows the transect through the rifle range. Between the 300 yard positon and the 500 yard position the ground surface can be seen to slightly rise and fall, producing a prominence, which, when lying down and firing at this location, obscures the

targets from view. The platform was therefore an essential addition to enable the 500 yard location to be used.

4.10 Latrine block and turning circle

4.10.1 With the decommissioning of the 600 yard firing position and those to the east of it, the turning circle was established as the maximum extent of the rifle range and as such became the point at which full safety precautions were no longer required. It remains as a tarred surface, though barely visible through a thin covering of topsoil and grass. A building at this location is shown on the 1911 Ordnance Survey map and curiously shown right through to modern maps, despite having been removed at some point in the 1970s (Steve Handerer *pers. comm.*). The structure would have operated as a store, workshop and administration area and the maps give an approximate size of 3.5m by 5m. That no walls remain suggest that it was of a temporary nature, perhaps of wood and corrugated iron and similar in size and construction to the workshop in the target area.

4.10.2 The latrine block that currently stands in this area is an additional structure to the main building shown on the maps - located 3m to the east, it survives, though in poor condition (figure 21). That the latrine is not marked on any map is surprising, although the latrine in the target area is also unmarked. Dating of the latrine block is uncertain, though it is likely to date either to the Second World War rebuild, or perhaps more likely with the post-war consolidation of the site. Measuring 1.8m by 2.05m, the latrine block consists of two cubicles each 0.88m wide. Remnants of the wooden doorframe can be seen on the western cubicle, whilst the eastern cubicle is in a poor condition, the concrete roof having collapsed above it and the wall too in a derelict state.

4.11 600, 700 and 800 yard firing positions

4.11.1 The 600 yard firing position was removed at some point before the Second World War. Despite being marked on the 1947 Ordnance Survey map, there is no evidence of the firing position in use on the 1946 aerial photograph, other than a ploughed out scar in the cultivated field. The 700 yard firing position occupies a location in the hedgerow between the track from Mouse Lane and the field to the north – it may well still exist in the undergrowth as a small bank. The 800 yard position, however, was situated entirely in the space now occupied by the track and if it originally existed as a bank, it would have been levelled during the construction of the track. These last two firing positions seem to have been phased out of use by 1911.

4.12 Flagstaffs and danger boards

4.12.1 All five of the flagstaffs shown on the 1971 Ordnance Survey map are still in place (figure 22):

- Flagstaff 1, to the north of the track, at the entrance to the rifle range.
- Flagstaff 2, on the public footpath and ridge to the south of the rifle range.
- Flagstaff 3, 550m west of the targets, on the north-south footpath at the extent of the wooded area.

- Flagstaff 4, 270m west of Sussex Barn, to the north of the public footpath.
- Flagstaff 5 on the crest of the ridge above the rifle range at Sussex Barn.

4.12.2 Most flagstaffs still retain an element of visibility despite encroaching woodland, except that is for flagstaff 4, which is now entirely engulfed by trees.

4.12.3 The 1911 Ordnance Survey map show flagstaffs either side of the target area, in similar locations to the current positions, and it is not clear if these were the same but only approximately surveyed, or in fact slightly differently sited flagstaffs. The Flagstaff above the target area and 100m east of the cross dyke shown on the Ordnance Survey maps is certainly no longer present – this area, which was grassland in 1911, is now covered in trees and bicycle jumps.

4.12.4 Alongside flagstaff 4 is a surviving danger board, a diamond shaped panel on a post, warning walkers of the entry into the danger area. The area is now heavily overgrown.

4.12.5 On the path to Sussex Barn from flagstaff 3, is a danger board from the late 1980s (Steve Handerer, *pers. comm.*). A small rectangular metal sign fixed to a concrete fence post, it warns walkers to 'KEEP STRICTLY TO THE BRIDLEWAY'.

4.13 Danger Area

4.13.1 Every rifle range requires a danger area (to account for stray shots and ricochets) and that laid down in the 1931 Small Arms Training manual states that it should start at the furthest firing position, widening to 250 yards (229m) at the targets and, widening again to 500 yards (457m) it should extend 2500 yards (2286m) beyond the targets (figure 23). The addition of the danger area reduces the actual rifle range to being merely a fraction of the overall site. Policing of a danger area so close to the town and which cuts through a popular South Downs walking route was undoubtedly one of the reasons resulting in the closure of the range.

4.14 Additional areas

4.14.1 Nothing visible remains of the gas training building, to the north of the rifle range. The area is currently fallow but it is possible that footings of the building may still remain beneath the plough soil.

4.14.2 A cluster of buildings visible on the 1946 aerial photograph have left no trace on the ground, though the exact nature of their fabric is uncertain and they may well have been tents.

4.14.3 The building at the extreme eastern limit of the range, first visible on the 1897 Ordnance Survey map, is no longer standing, although the area is currently quite overgrown and seems to be the setting for a disused watering trough.

4.14.4 Windsor Cottage, on the corner of Mouse Lane and Horsham Road (figures 23 and 24), referred to in the 1905 Kelly's directory as the Armoury, still stands, giving no hint of its time connected to the rifle range.

5.0 Conservation

5.1 The current configuration of the rifle range can be attributed to the Second World War and though it was undoubtedly enhanced in the post war years, the continued use of the site until the late 1980s has led to the remarkable preservation of the site. Conservation of any site out of the way from inhabited areas is always going to be a battle against preservation and vandalism, but perhaps the thinning of trees (as is currently underway) and general cleaning up of the area would help to emphasise the point that the area is managed.

5.2 Cracks in the retaining wall of the markers' gallery and roof of the target store could be assessed by a structural engineer, though it seems unlikely either are major problems. More pressing, perhaps, is the heavy concrete roof of the markers gallery, supported by sixteen iron brackets bolted to the wall. The trees now growing on top of the mantlet appear to be growing over the roof in some cases and roots of others will undoubtedly be exerting some additional pressure on the structure, compromising its stability.

5.3 A new door on the target store would extend the life span of the structure as well as potentially providing a store for equipment used in maintaining the site. The existing door would seem to have been buried under chalk and soil which has slumped onto it from the valley side, in the workshop area. This slumping has been hastened by the recent use of the area as a bicycle ramp, and the overall condition has deteriorated rapidly in the last four years. Clearance of the rubble and door would aid in the cessation of the destructive activity.

5.4 The target frames could benefit from an overall clearance of the vegetation and soil surrounding their bases in the target trench. Perhaps a coat of rust proof paint would ensure continued preservation.

5.5 The stop butt area seems currently fairly stable, a few fire pits and a bicycle jump have appeared in recent years, but neither seems particularly damaging.

5.6 The 100, 200 and 300 yard firing positions are in a very stable location, in the cattle managed grassland.

5.7 The 500 yard firing position is in a semi-collapsed state and many of the iron bars holding up the telegraph pole revetting having been pushed out of shape. A general clearance of the vegetation around the position would allow for a greater understanding of its current state and perhaps present an opportunity for limited repair work to be carried out.

5.8 The only structure posing an immediate threat to safety is the latrine block at the turning circle. Half of the concrete roof and brickwall have so far collapsed and it would seem likely thatthe rest will follow soon. It would be difficult to envisage or justify repair to the structure, so perhaps demolition to footing level is the best option (allowing the structure to remain part of the historic landscape). If this was the case, perhaps an archaeological investigation of the immediate surrounding area would be a good balance, to try and locate the building the latrine was associated with.

6.0 Bibliography

Beckett, I.F.W.1982. *Riflemen Form: A Study of the Rifle Volunteer Movement 1859-1908*. Pen and Sword, Barnsley

Hawes, A.B. 1859. *Rifle Ammunition, Notes on the Manufactures Connected Therewith, As Conducted in the Royal Arsenal, Woolwich*. Nabu Public Domain Reprints, 2010

Hodgson, Major B.T. *Record of the Fourth Battalion Royal Sussex Regiment from 1859 to 1913*. (1914) Hazell, Watson and Viney Ltd, London. (West Sussex Records Office).

Petley, A.G. 1961. *Sussex County Rifle Association 1861-1961*. Mitchell and Company, Arundel

Russell, J. 2012. *Preston Hills Rifle Range, Level 2 Historic Building Record.* Archaeology South-East.

The War Office, 1858. *Regulations for Conducting the Musketry Instruction of the Army*. Her Majesty's Stationery Office, London

The War Office, 1889. *Regulations for Musketry Instruction*. Her Majesty's Stationery Office, London

The War Office, 1910. *Musketry Regulations. Part II. Rifle Ranges and Musketry Appliances.* His Majesty's Stationery Office, London.

The War Office, 1931. *Small Arms Training, Volume V: Small Arms Range Regulations*. His Majesty's Stationery Office, London.

The War Office, 1945. *Small Arms Training, Volume V, War Supplement, Small Arms Ranges: Layout, Safety and Equipment.* His Majesty's Stationery Office, London.

The War Office, 1958. *Infantry Training Volume III: Ranges and Courses. Pamphlet No. 32 Range Construction and Regulations*. Her Majesty's Stationery Office, Liverpool.

Fig. 1: Location of Steyning rifle range

Fig. 2: Location of Volunteer rifle ranges in Sussex (circa 1860)

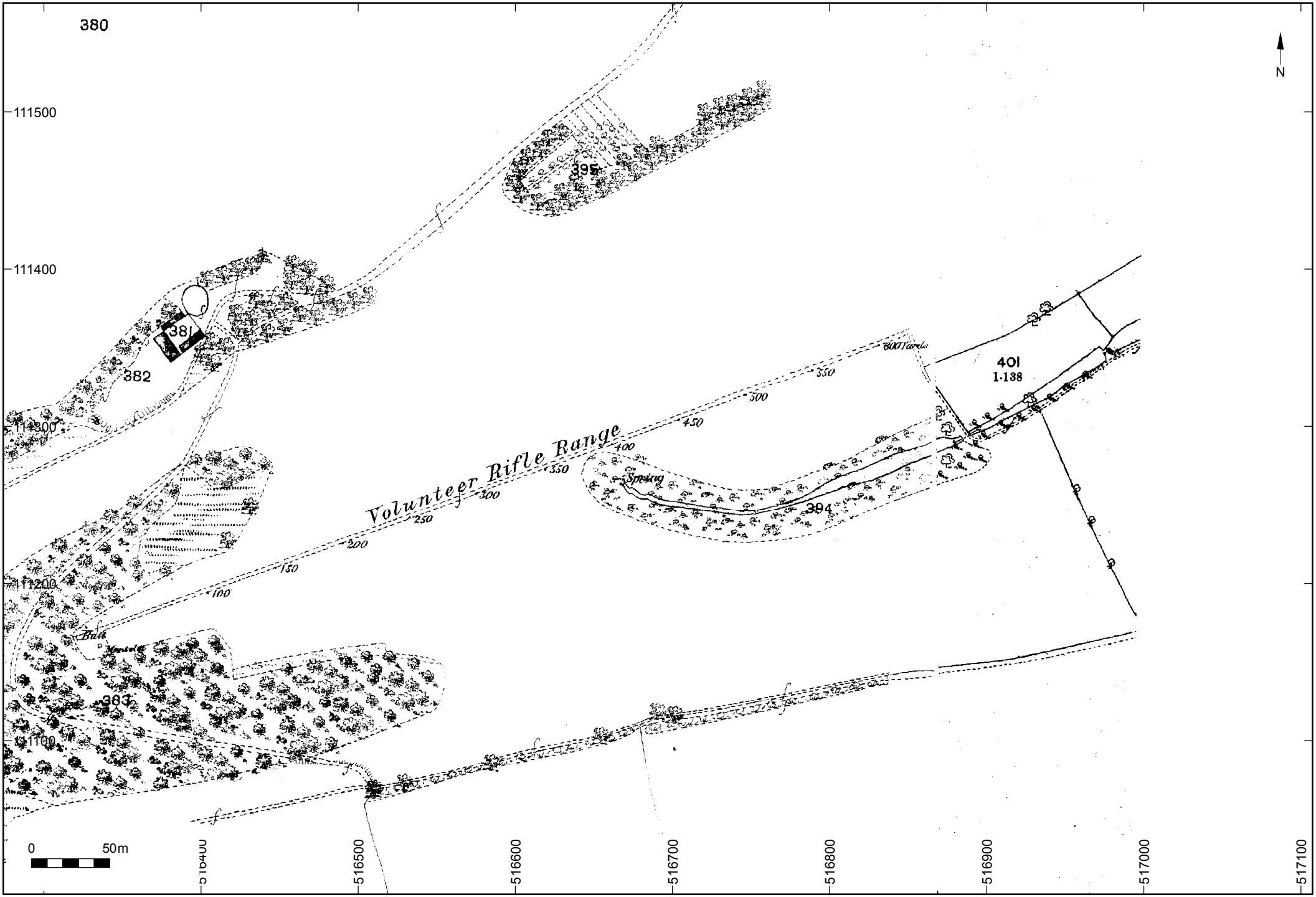


Fig. 3: 1875 25" Ordnance Survey map

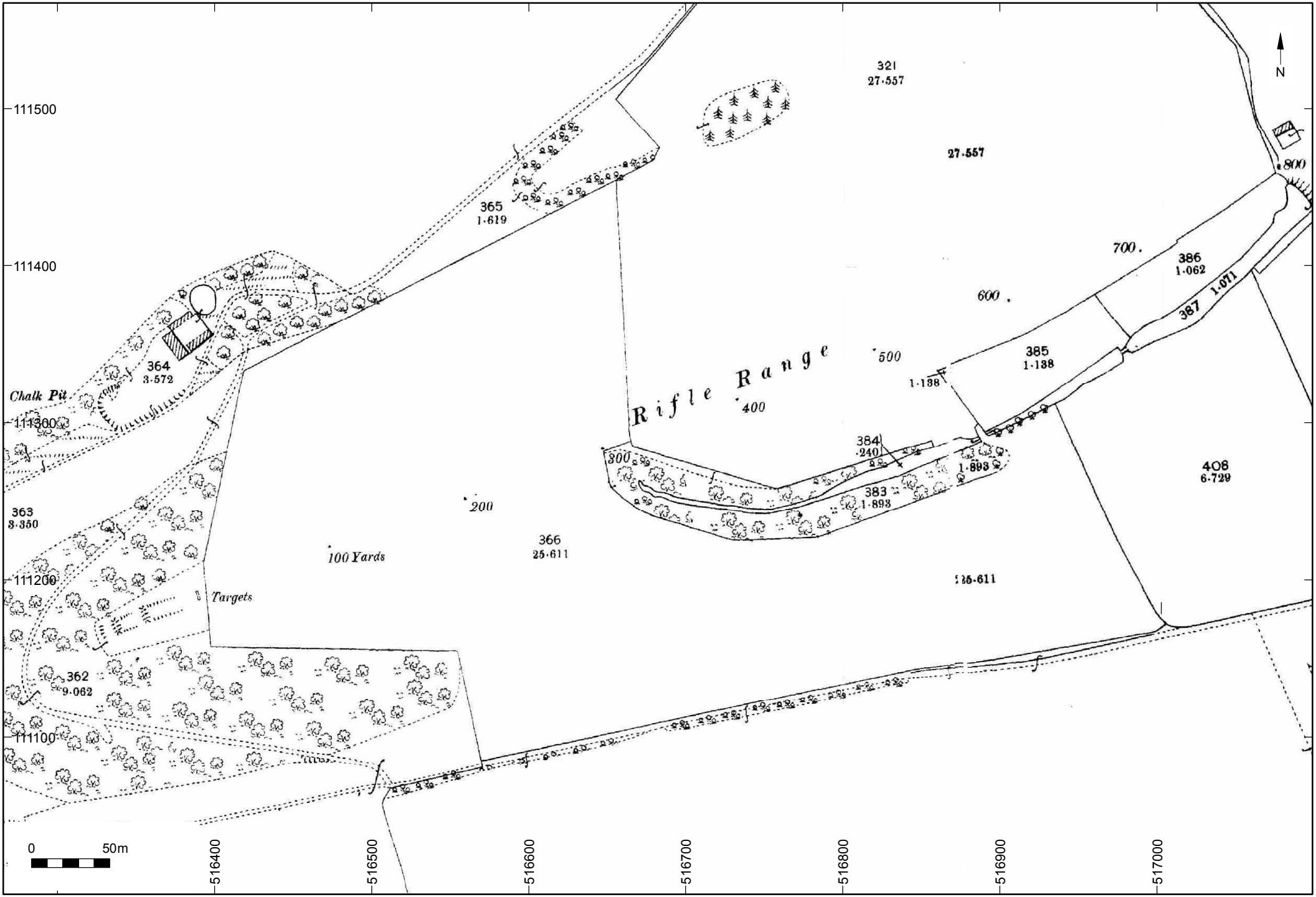


Fig. 4: 1897 25" Ordnance Survey map

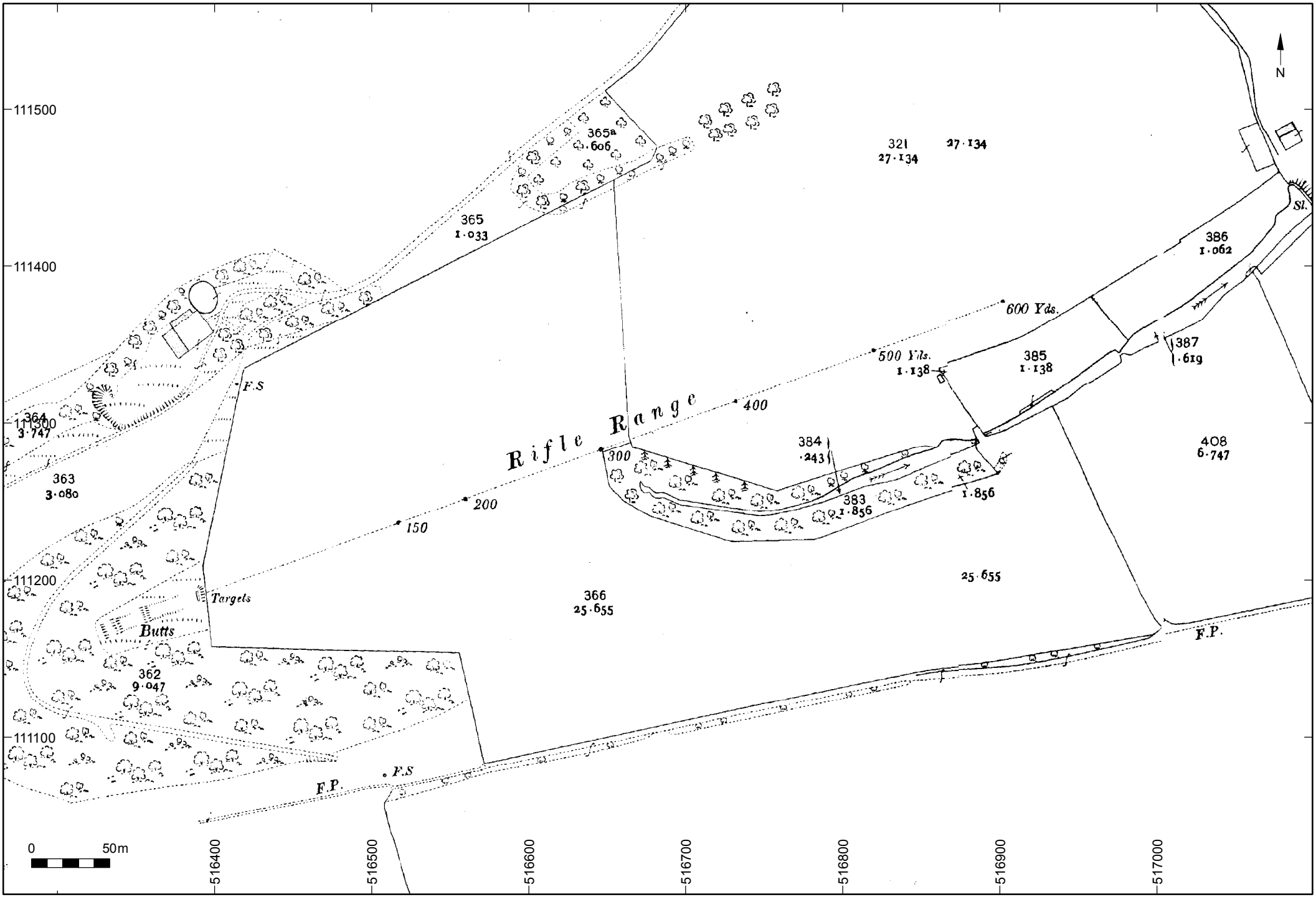


Fig. 5: 1911 25" Ordnance Survey map

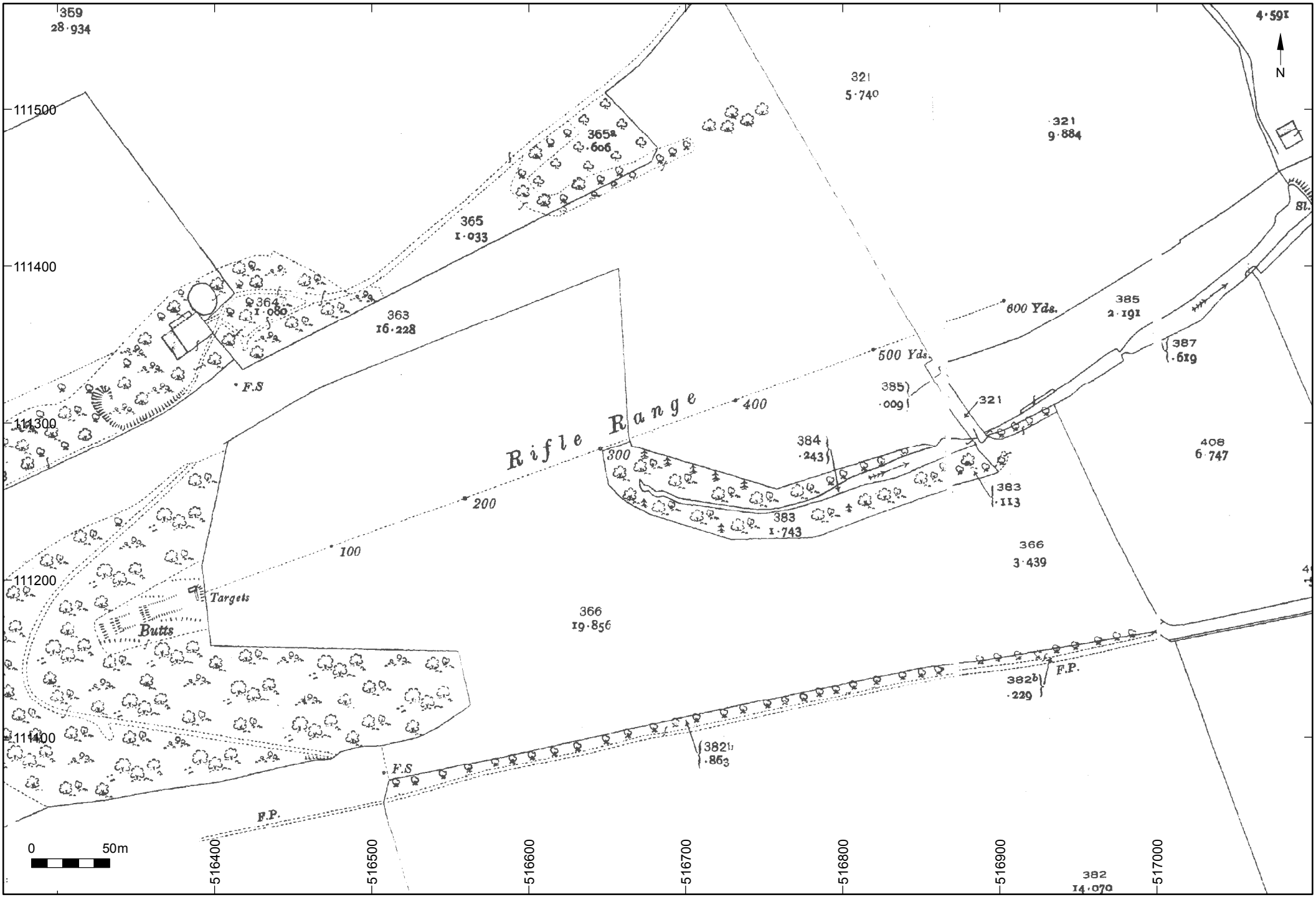


Fig. 6: 1932 25" Ordnance Survey map

Fig. 7: 1946 aerial photograph

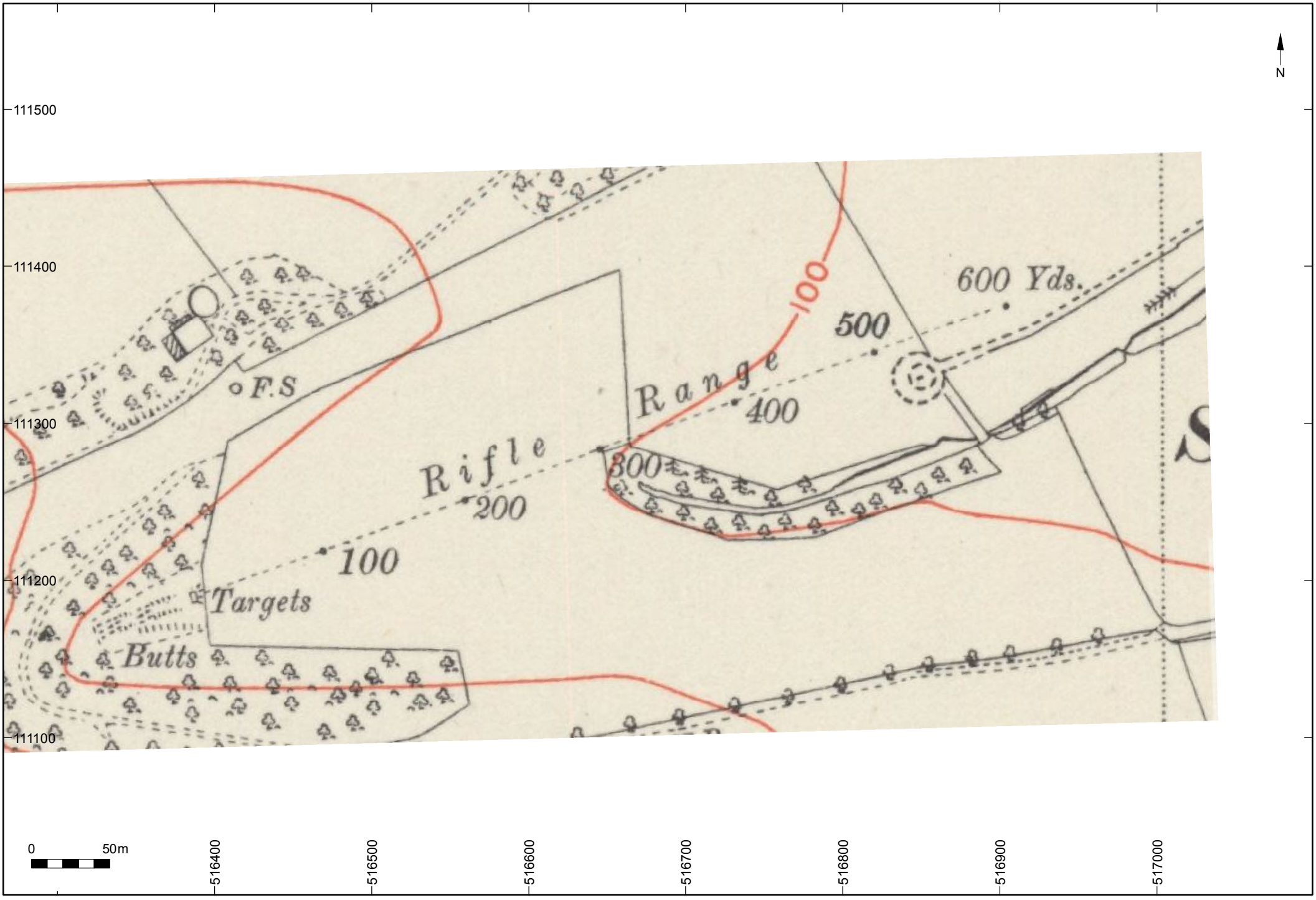


Fig. 8: 1947 6" Ordnance Survey map

Fig. 9: 1959 aerial photograph

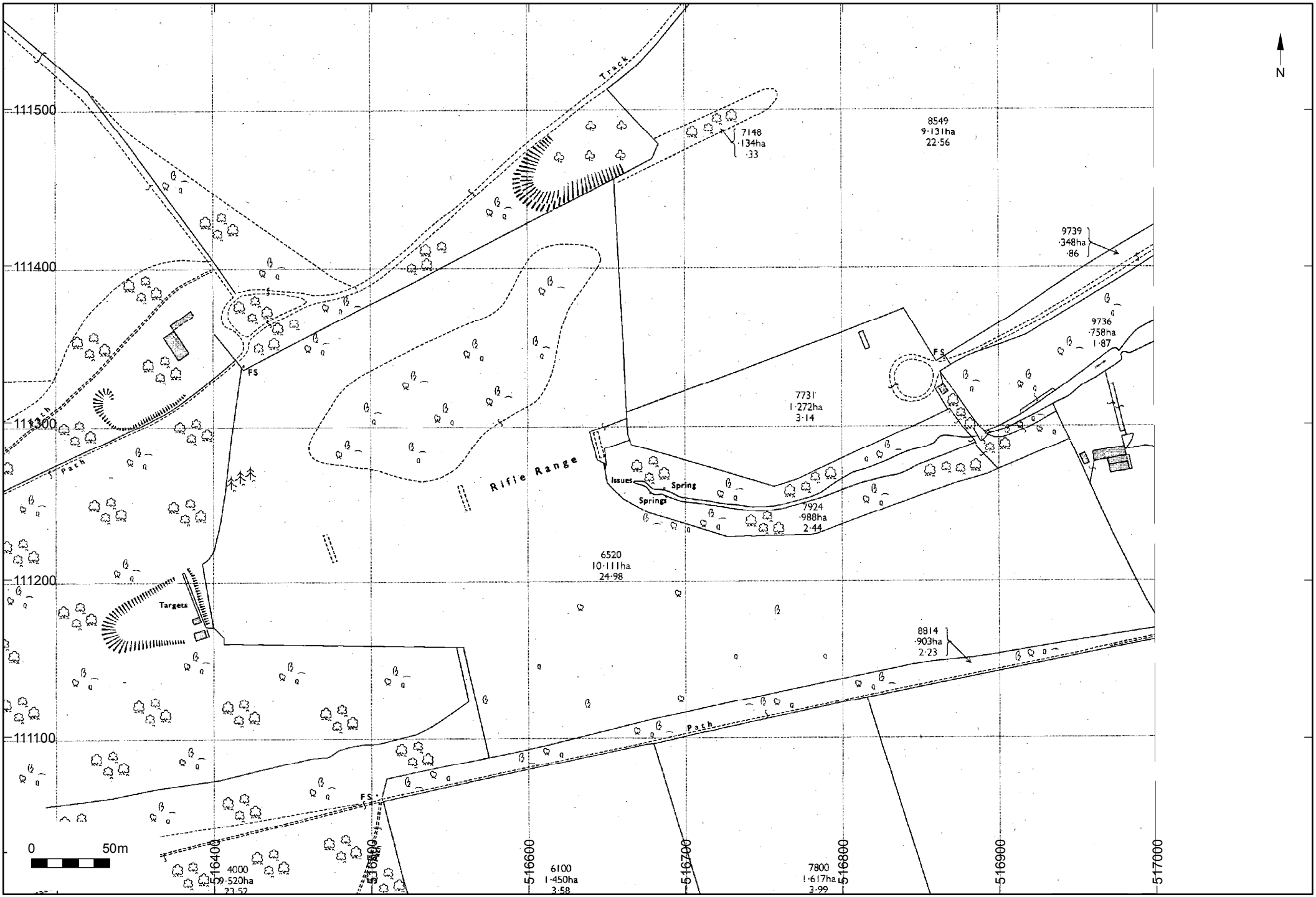


Fig. 10: 1971 1:2500 Ordnance Survey map

Fig. 11: 1975 aerial photograph

Fig. 12: 2015 aerial photograph (Google Earth)

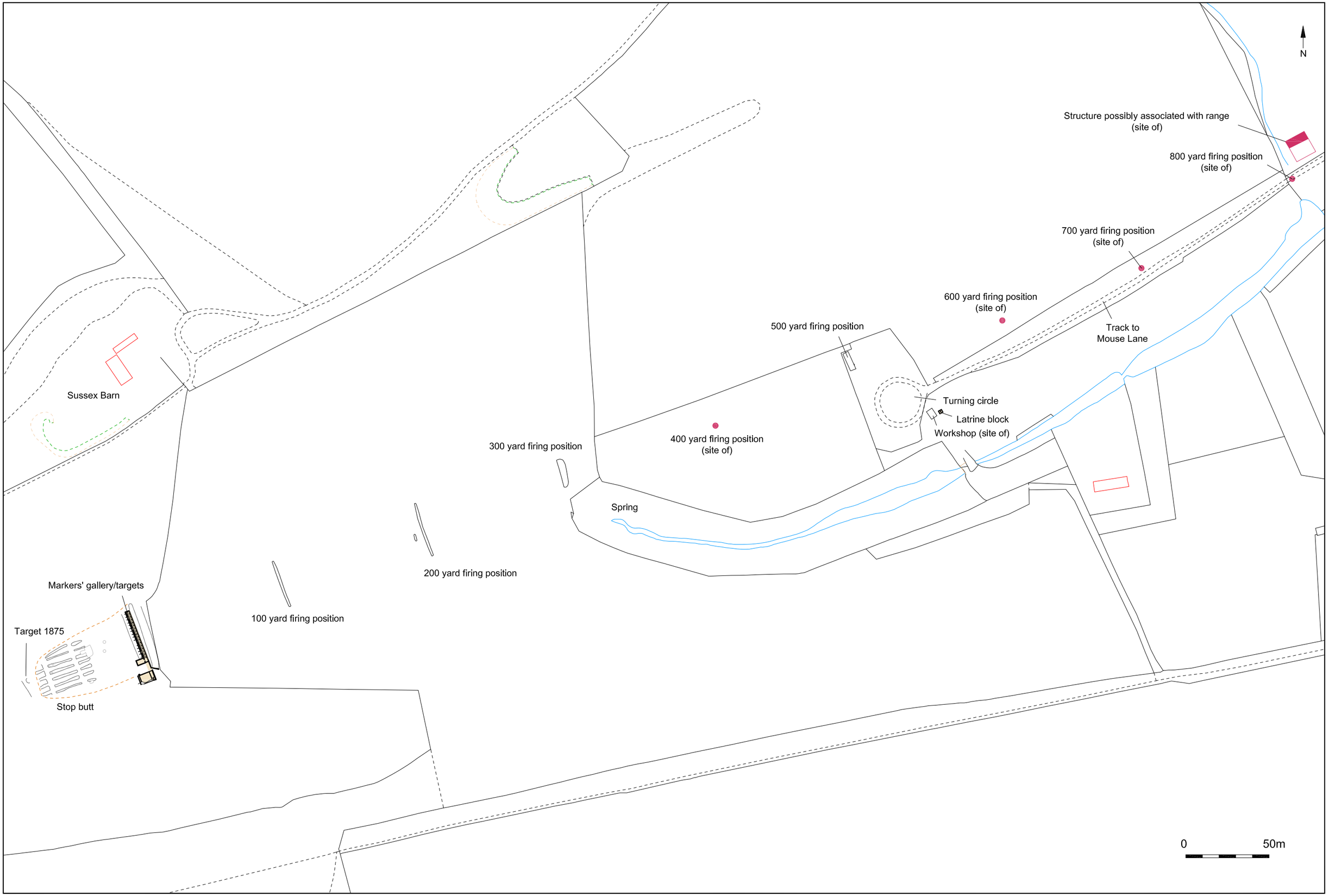


Fig. 13: Plan of the rifle range

Iron target of the type shown on the 1875 Ordnance Survey map - this example is from the Preston Hills rifle range, in Kent.

Rear view of the Preston Hills target, showing a brick and earth mantlet at the top left. Though the mantlet is of a different type and on the opposite side to the early target area at Steyning it gives a general idea of the basic layout.

Stop butt area, looking east towards the markers' gallery from the 1875 target site. The two cross trenches are visible in the middle of the picture.

Detail of the western cross trench, near the site of the 1875 mantlet. Note the regular appearance and flat top of the bank heading east.

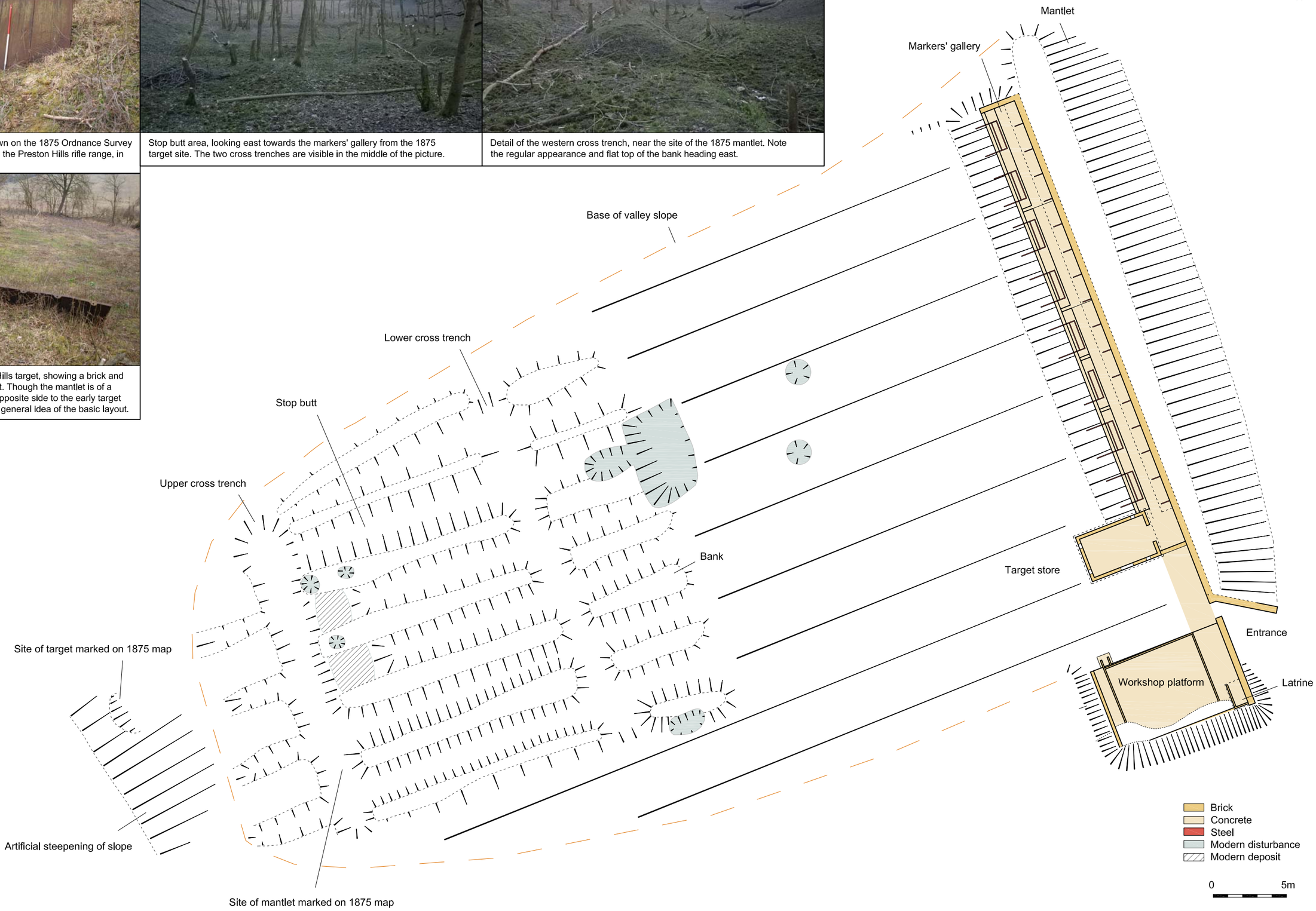


Fig. 14: Plan of the target area and stop butt

Bottom of mantlet slope

Top of mantlet slope

N

Stepped brickwork

Brackets supporting concrete roof

Elevation 1

Entrance

Stepped brickwork

Outline of concrete roof

Socket for flag

Step

Latrine

Step

Target frame 8

Target frame 7

Target frame 6

Target frame 5

Target frame 4

Target frame 3

Target frame 2

Target frame 1

Vent

Target store

Window

Original floor surface not visible in this area

Workshop platform

Target trough

Target trough partition

Section through markers' gallery

Top of target slope

Wind strut missing

Outline of concrete roof

Slumped soil and chalk from valley side

Elevation 1

Drilled holes for original brackets

Telephone socket

Drilled holes for telephone shelf

Concrete roof

Topsoil covering roof

Projected target store outline

Socket for flag

Concrete roof

Target frame 8

Weep hole

Target frame 7

Target frame 6

Target frame 5

Target frame 4

Target frame 3

Target frame 2

Target frame 1

Notches in wall for door frame

Latrine

Target trough

Target trough partition

Simplified target frame

Slots for bench

Concrete floor

Step

Entrance

42.70mOD

Markers' gallery, looking north

Entrance to the markers' gallery, looking west

Latrine and workshop footings, looking south

Workshop and latrine, looking east

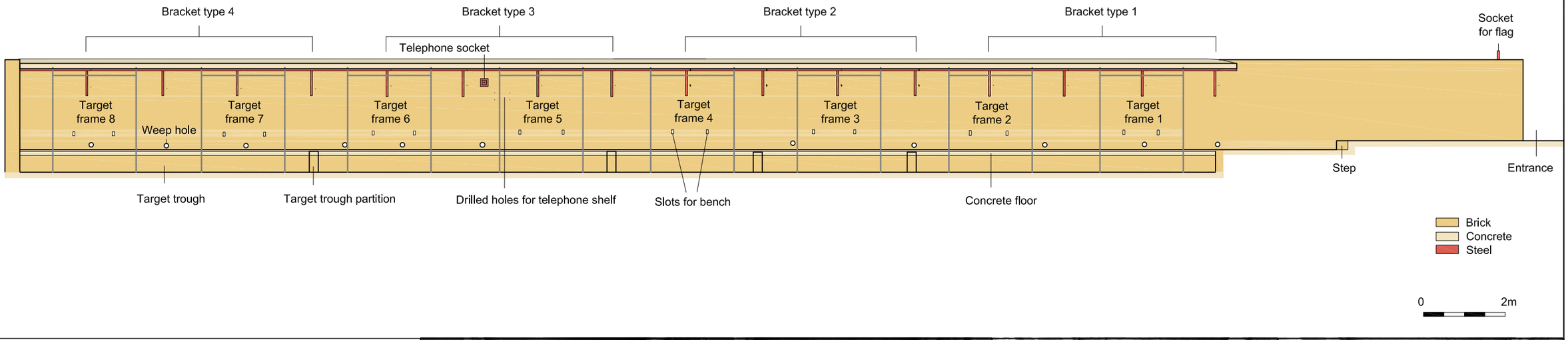
Latrine and target store looking north-west

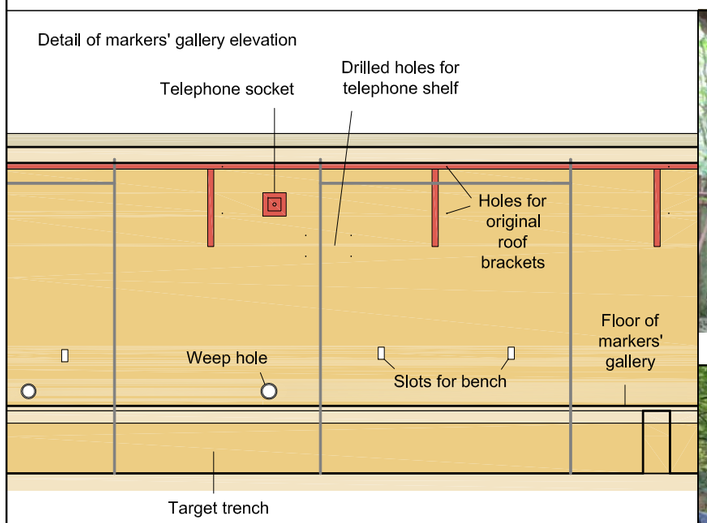
Brick
Concrete
Steel

0 2m

Fig. 15: Plan and elevation of markers' gallery

Elevation 1





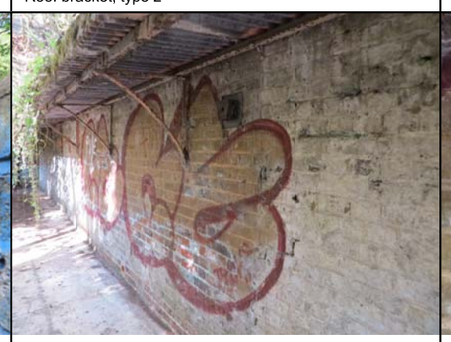

Roof bracket, type 1


Roof bracket, type 2


Roof bracket, type 3


Roof bracket, type 4


Concrete roof of markers' gallery


Telephone socket in retaining wall


Detail of telephone socket


Bench slots and weep hole

Original bracket location


Anti-ricochet stepped wall


Step outside target store

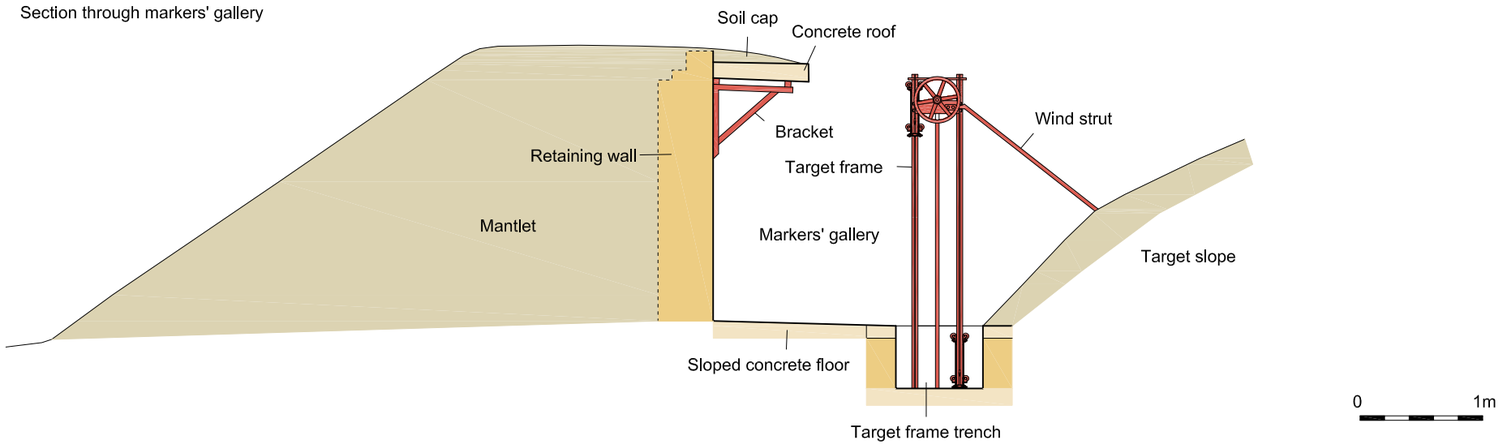

Flag pole socket


Grass mower 1

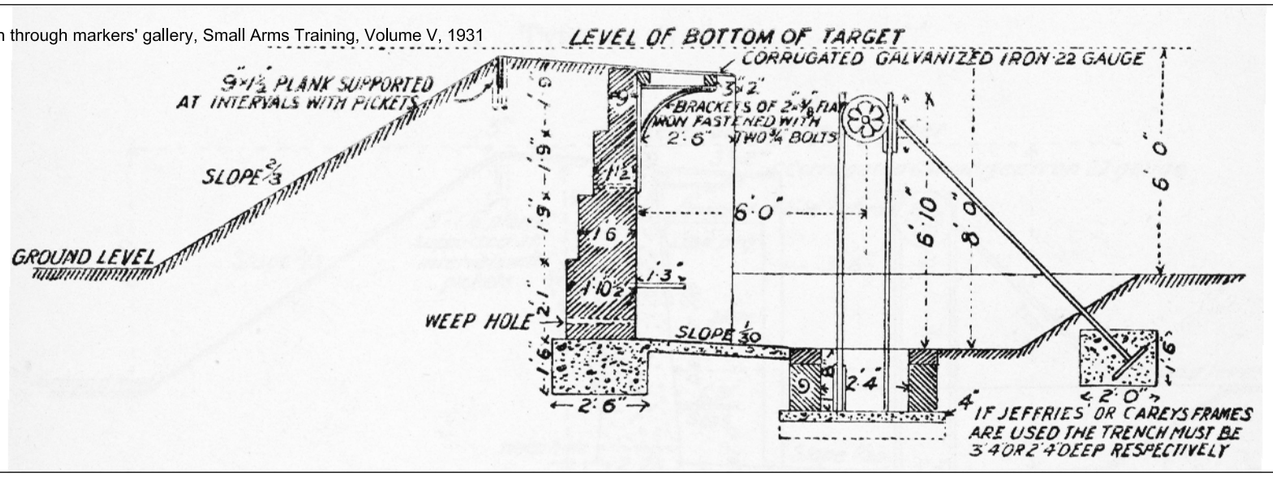

Grass mower 2

Fig. 16: Markers' gallery details

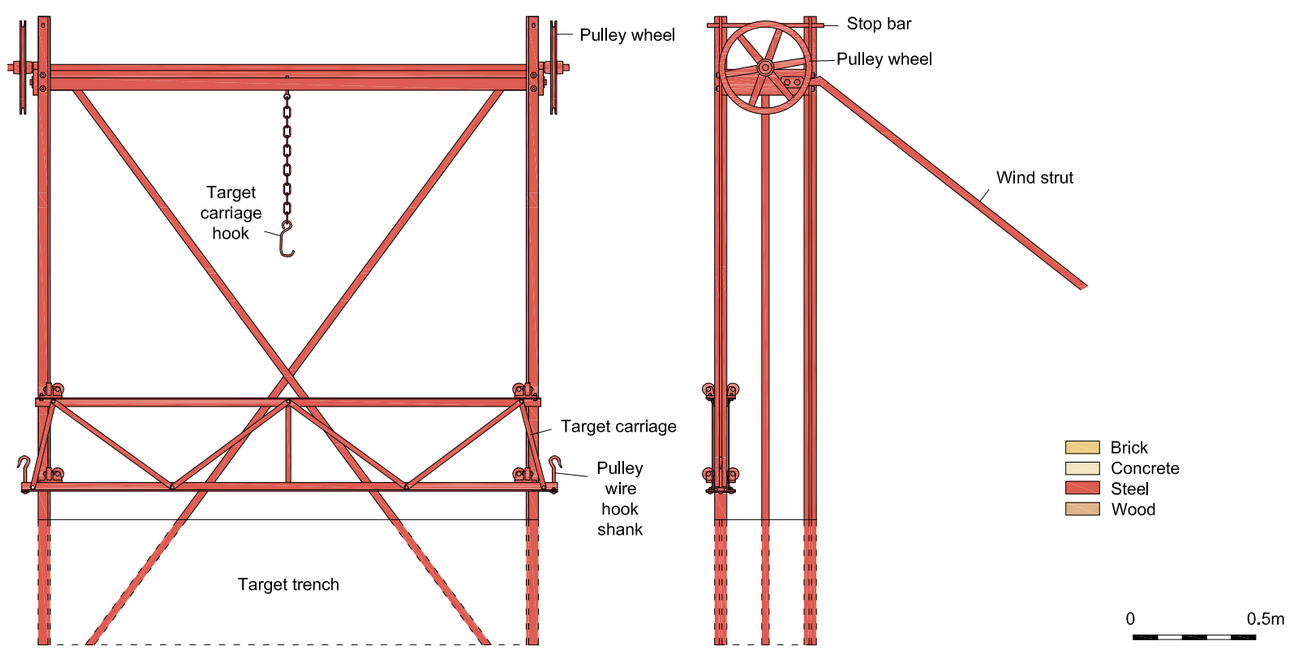
Section through markers' gallery



Section through markers' gallery, Small Arms Training, Volume V, 1931



Target frame



Target frame 1, looking south

Target frame 1, pulley wheel and wind strut

Detail of pulley wheel

Wind strut, type 1

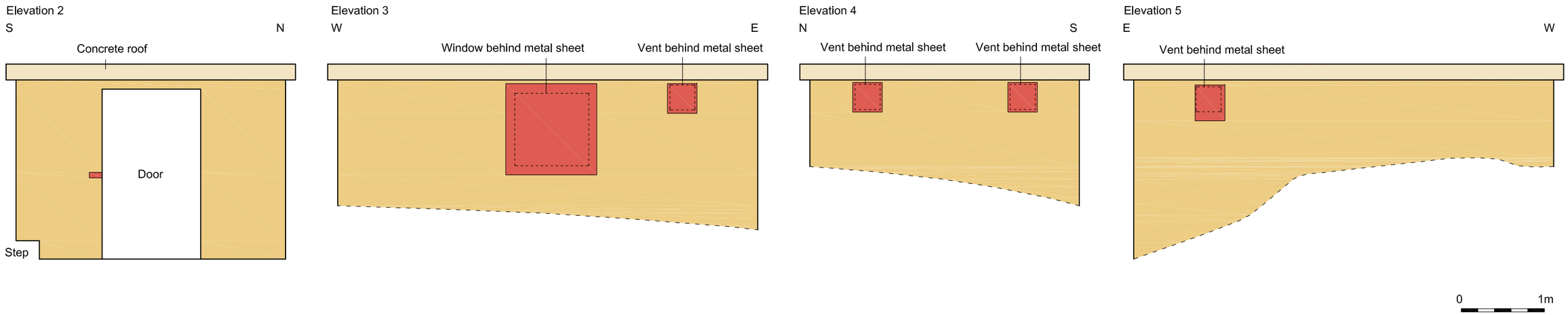
Wind strut, type 2

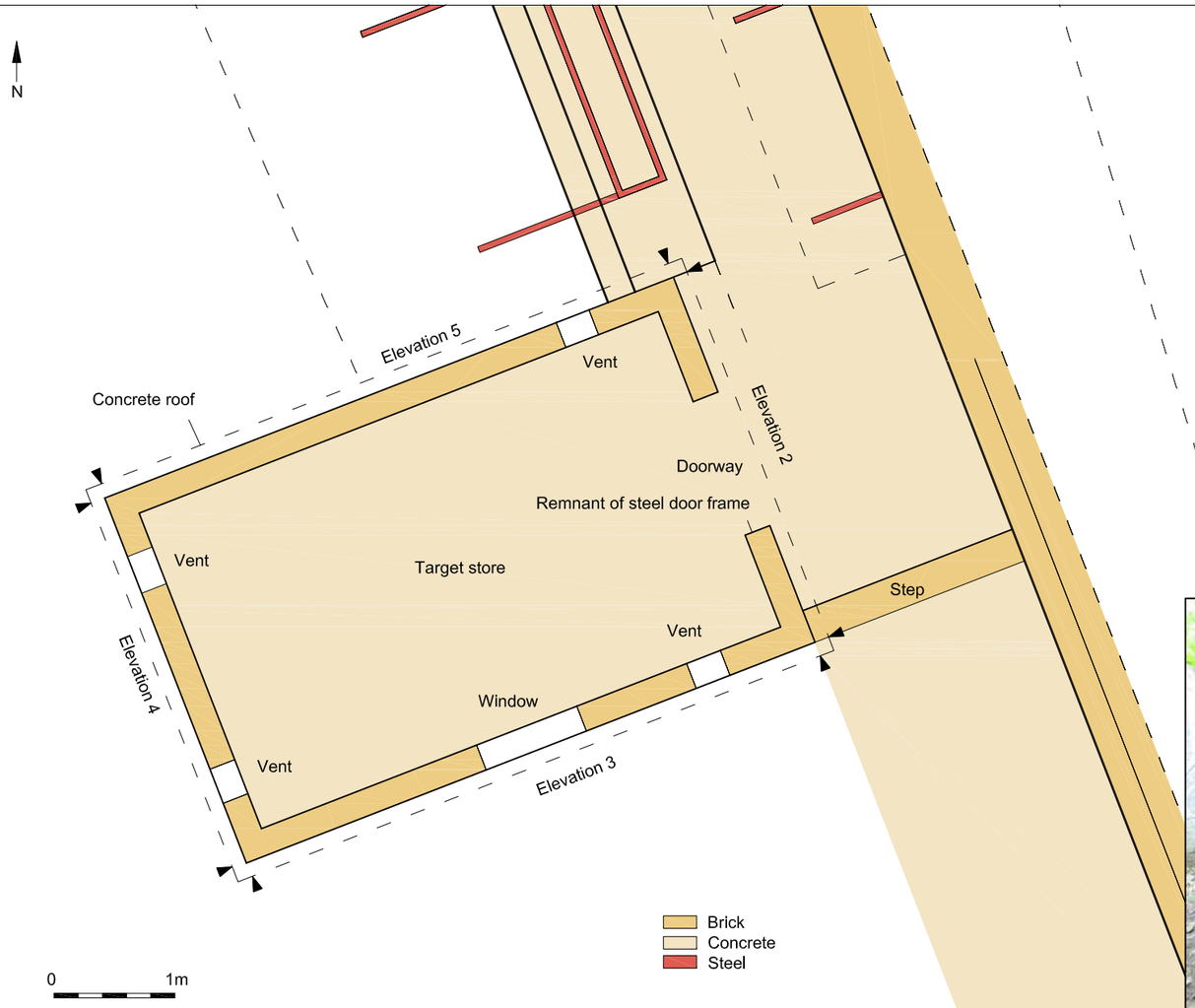
Wind strut, type 3

Target carriage

Hook shank, fixed to base of carriage

Fig. 17: Section through markers' gallery and target frame detail






Target store, looking north-west


Target store, looking north


Target store, looking east


Target store, looking south


Remnant of the original door frame


Window, from the inside, looking south

Interior west wall of target store

Fig. 18: Elevations of target store

100 yard firing position, looking north

Earthwork in front of 200 yard position, looking north-east

200 yard firing position, looking south-east

300 yard firing position, looking north

Looking west to targets from 300 yard firing position

500 yard firing position

500 yard firing position (February 2014)

Fig. 19: 100, 200 and 300 yard firing positions

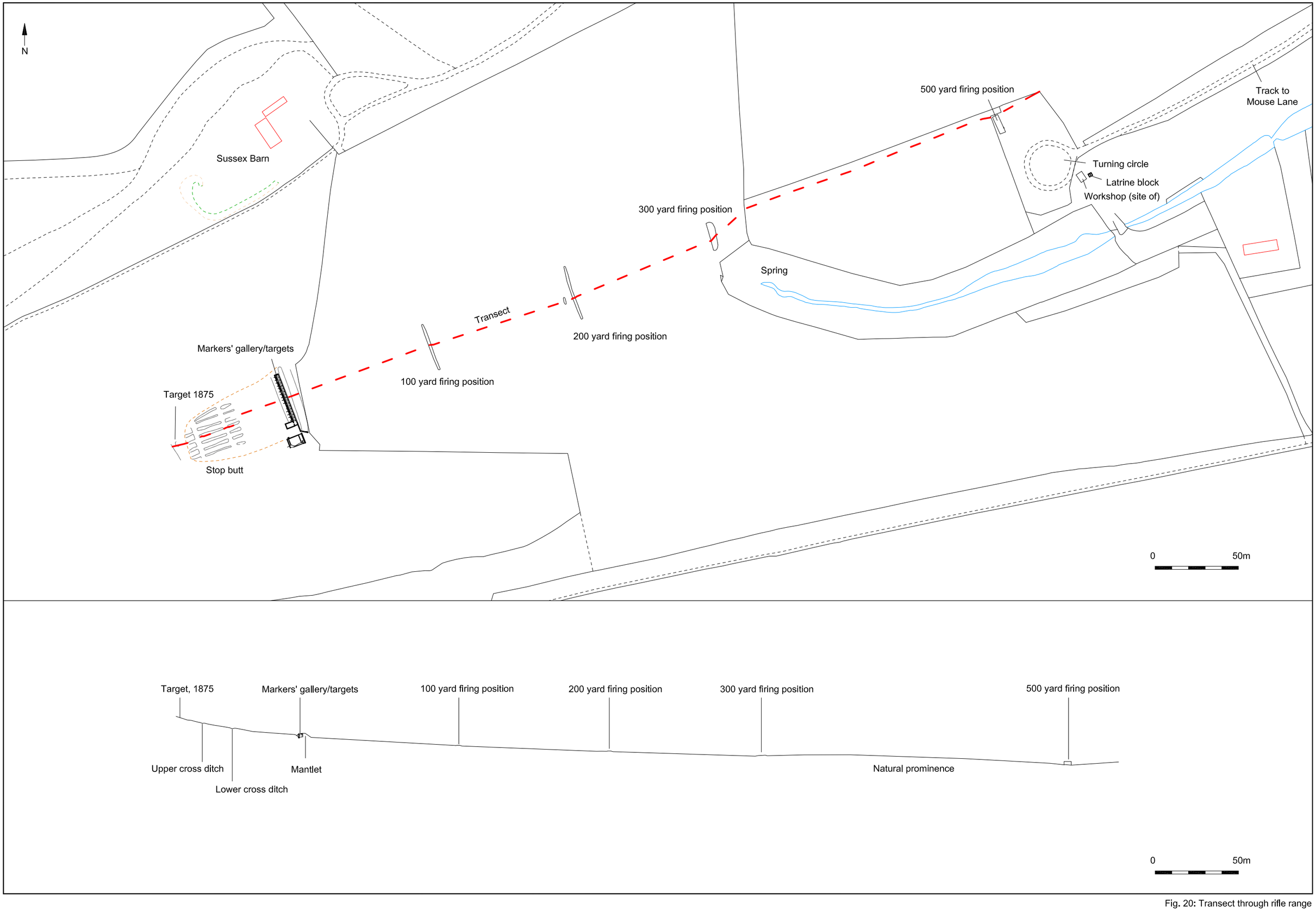
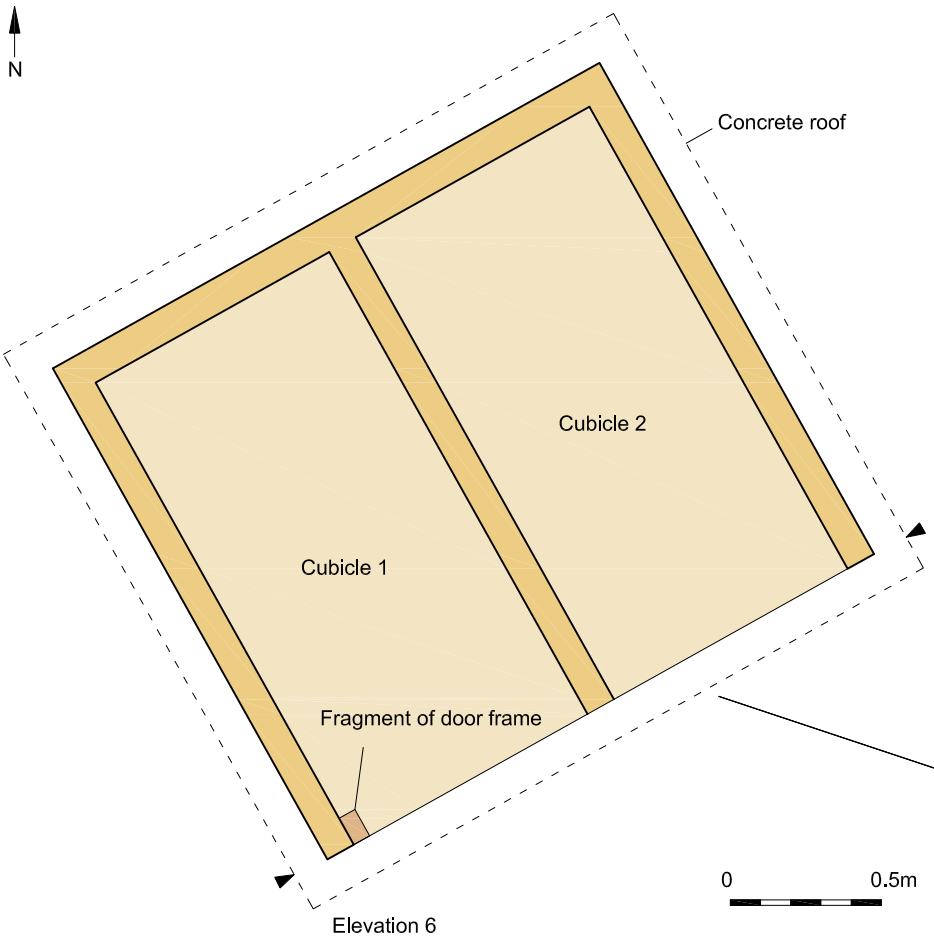


Fig. 20: Transect through rifle range



Cubicle 1, looking north-west

Rear wall of latrine, looking south-east

Remnant of door frame and hinge

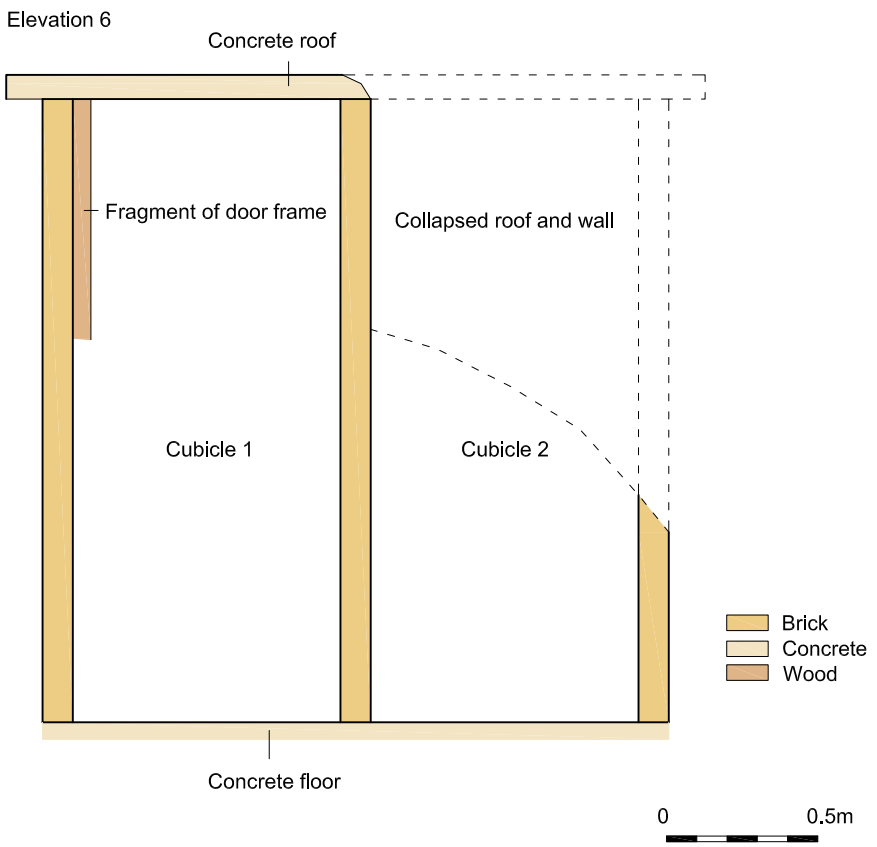


Fig. 21: Plan and elevation of latrine block

N

Flagstaff 1

Flagstaff 5

Flagstaff on 1911 map (site of)

Flagstaff 4 and danger board

Flagstaff on 1911 map (site of)

Flagstaff 2

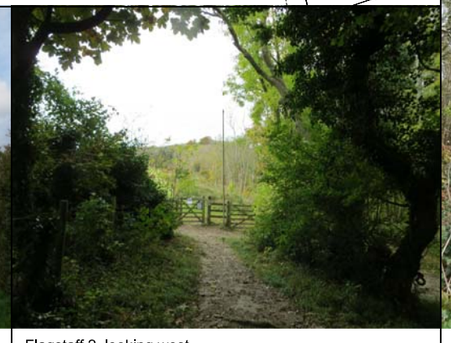
Flagstaff on 1911 map (site of)

Late 1980s danger board

Flagstaff 3

0 100m

Flagstaff 1, looking east down the track to Mouse Lane



Flagstaff 2, looking west

Flagstaff 3, looking south

Flagstaff 4, looking north-west

Flagstaff 5, looking south-west

Late 1980s danger board

Danger board associated with flagstaff 4

Fig. 22: Location of flagstaffs and danger boards

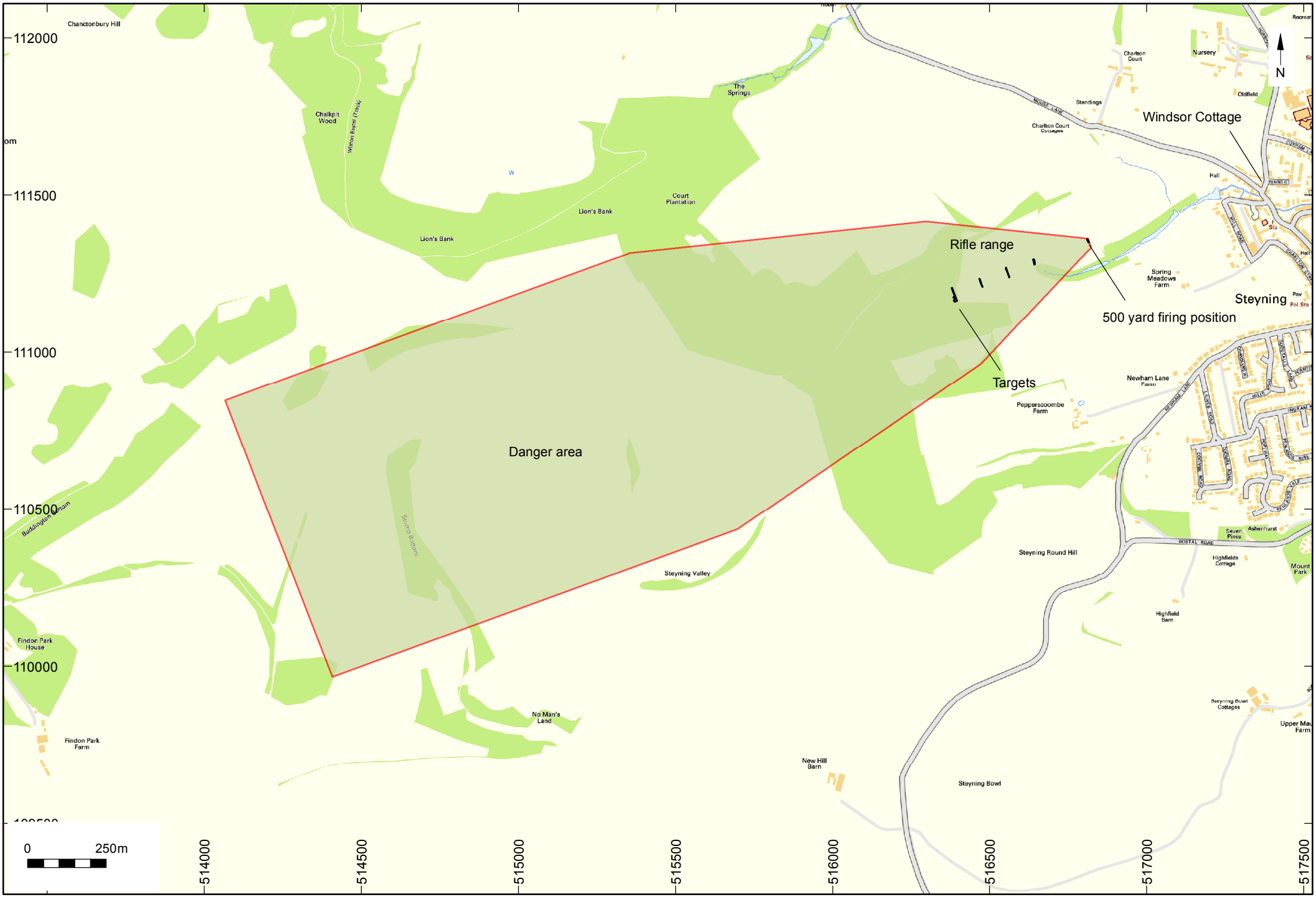


Fig. 23: Theoretical danger area

Fig. 24: Windsor Cottage, the ‘Armoury’