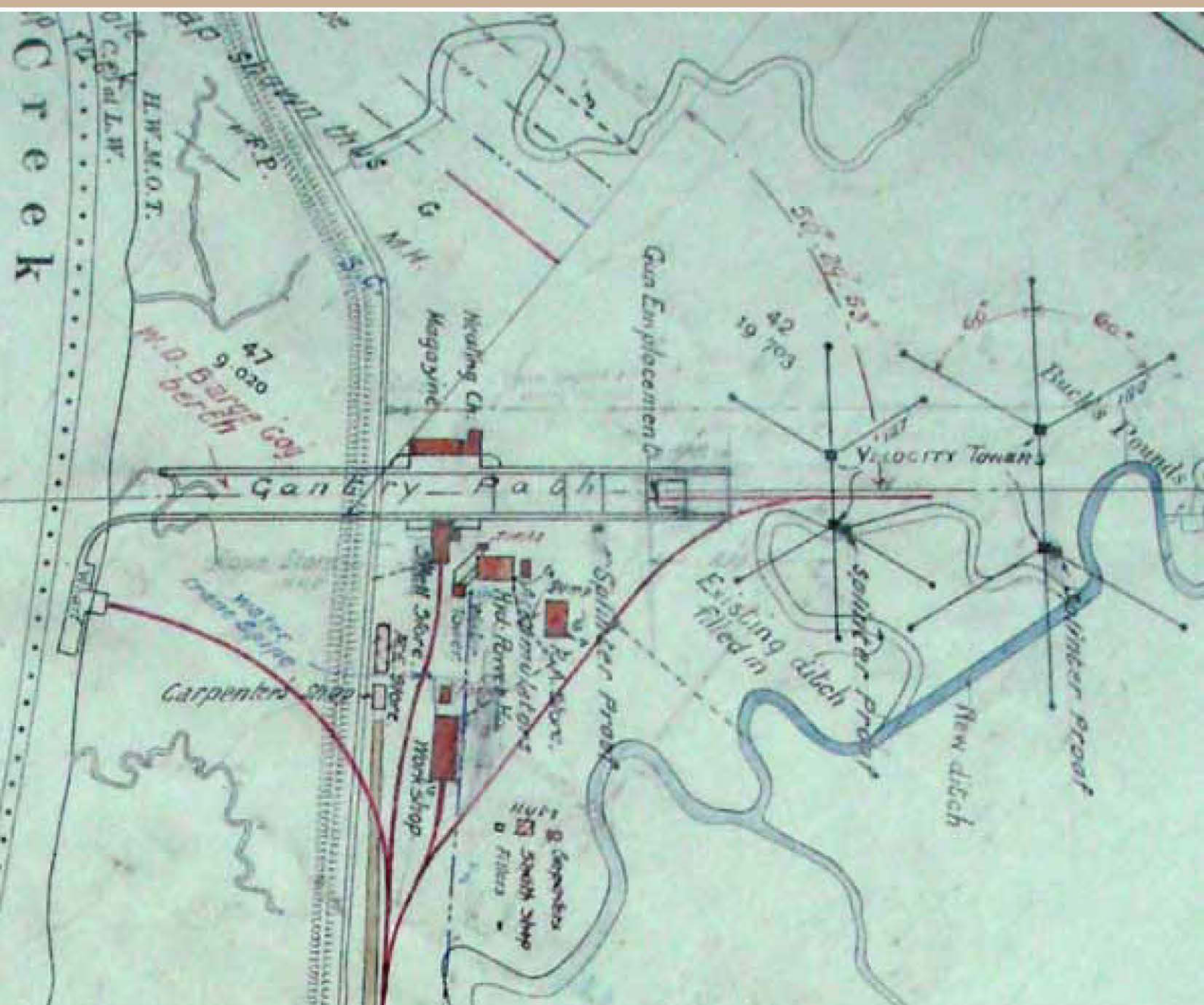


GRAIN ISLAND FIRING POINT, YANTLET CREEK, ISLE OF GRAIN, MEDWAY ARCHAEOLOGICAL DESK-BASED ASSESSMENT

Matt Edgeworth



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Archaeological Desk-Based Assessment

Matt Edgeworth

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SUMMARY

This report describes the results of a desktop assessment of the 20th-century trials battery and firing point at Yantlet Creek on the Isle of Grain, Kent. It starts by considering the general archaeology and history of Yantlet Creek and the adjacent area of marshland on its eastern side. The status of the creek as a former navigation channel and the rich landscape of former salt-workings are highlighted. The main focus of the report is on the military installations. In 1917, towards the end of the First World War, the Admiralty requisitioned marshland to the east of Yantlet Creek, and in the 1920s the War Office formally purchased it for the purpose of building a firing point for testing large weapons. One of the names of the establishment, cited on early plans, was 'Grain Island Firing Point'. It was also referred to as the Yantlet Battery. The firing point was an 'out' battery of the experimental establishment at Shoeburyness on the other side of the estuary. It was used for firing long-range shells in a north-easterly direction across the estuary into shallow water on the mudflats along the Essex coast, known as Maplin Sands. Facilities included two pairs of large velocity screen masts, an internal railway linked to the national network, a gun emplacement, a railway gun emplacement, domestic quarters and administrative offices, a gantry path for travelling crane and a wharf on Yantlet Creek for the unloading and loading of large guns and their mountings. The firing point is an unusual monument type, further distinguished by the length of the range of which it was a part, the size of the guns that were tested there, and the state of preservation of its surviving structures.

CONTRIBUTORS

Matt Edgeworth compiled the report, drawing in part from research carried out by Sarah Newsome and Rebecca Pullen for the English Heritage Hoo Peninsula Historic Landscape Project.

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DATE OF RESEARCH

May-July 2013

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INTRODUCTION

Background to the project

The firing point and trials battery at Yantlet Creek was identified as being of potential significance during the wider Hoo Peninsula Historic Landscape Project conducted by English Heritage starting in October 2009. This report is part of that project, while at the same time standing as an archaeological desk-based assessment in its own right.

The range is no longer in use as an artillery firing point and trials battery (though it is occasionally used for munitions disposal). Surviving remains include standing buildings, concrete bases, associated earthworks such as small railway embankments and purpose-built wharf and riverfront structures. Many structures have been demolished or dismantled and traces of these may survive in archaeological form. The aim of this report is to evaluate that which survives relative to that which has been destroyed, to examine a sample of the wealth of documentary evidence available, and on the basis of this to characterise the site and reach some basic understanding of significance and historical context.



Figure 1. Location map.

Location

The Isle of Grain is now considered part of the Hoo Peninsula on the south side of the Thames estuary, sheltering the River Medway on its southern side. It is very flat and low, with some land under pasture surrounded by large areas of saltmarsh, providing habitat for many varieties of birdlife.

Yantlet Creek is a winding watercourse which cuts off the northern part of the Isle of Grain from the rest of the Hoo Peninsula to the west. It once ran all the way between the Thames and the Medway, joining up with Colemouth Creek to the south, giving Grain its original island status.

Though no longer an island, the Isle of Grain retains a distinctive atmosphere that is different from the rest of Hoo. At 5.6 km long and 4.6 km wide, it is sparsely populated and appears remote, yet has a unique mix of marshland, farmland and industry. Occupying almost all of the southern part of the Isle of Grain is an industrial area that comprises the large container port Thamesport, Grain Power Station, and the National Grid's liquefied natural gas (LNG) facility. Looking southwards from the site, the tall cranes of the container port, the chimney of the power station and the giant storage tanks of the LNG facility dominate the skyline.

The firing point and trials battery occupied part of an area of land known as Grain Marsh, which is immediately to the east of Yantlet Creek in the north-west part of the Isle of Grain on the Thames estuary side. The exact boundaries of the site are difficult to define, partly because they changed throughout the lifetime of the installation, partly because the limits of property and shell-landing and danger areas (which are important components of the site, broadly conceived) do not exactly match or sometimes even remotely coincide, and partly because the site was a component of networks which extended far beyond the Isle of Grain and the Hoo Peninsula. For example, the Yantlet Creek railway and sidings which were such important aspects of the site (and around which many of the buildings and structures were positioned) were part of the much larger Isle of Grain railway, which in turn was linked in to regional and national networks. In mapping and describing the site, then, no fixed archaeological boundaries will be placed upon it.

Geology and topography

The Hoo Peninsula is located within the London Basin syncline – a depression between the Chiltern Hills to the north and the North Downs to the south. The underlying geology consists mainly of London Formation silts and clays laid down when the area was a marine embayment during the Palaeogene era (66-23m years ago).

Much of the surface geology consists of alluvial deposits. For a detailed account of the stratigraphy of gravel deposits on the Hoo Peninsula, see Bridgeland (2003). This sequence includes the so-called 'Grain gravel', laid down by waters of the Medway and Thames at a former confluence just to the east of the site. The shifting courses of the two rivers from the Early Pleistocene through to the Holocene are described and mapped in Hazell (2011). The saltwater marshes on both the Thames and

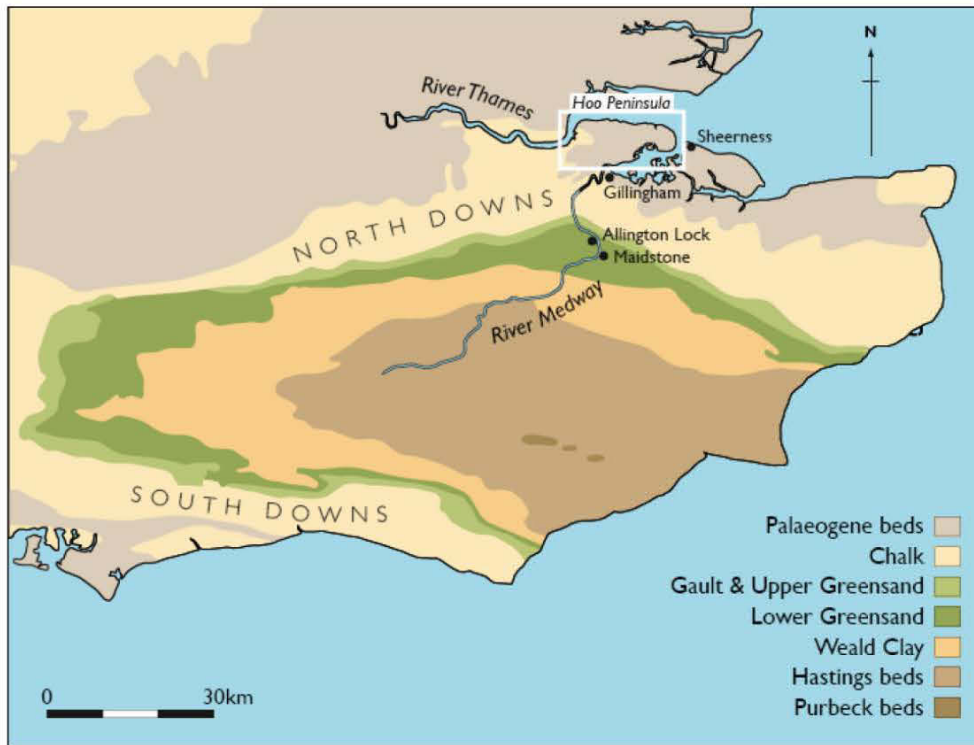


Figure 2. Underlying geology of southeast England.

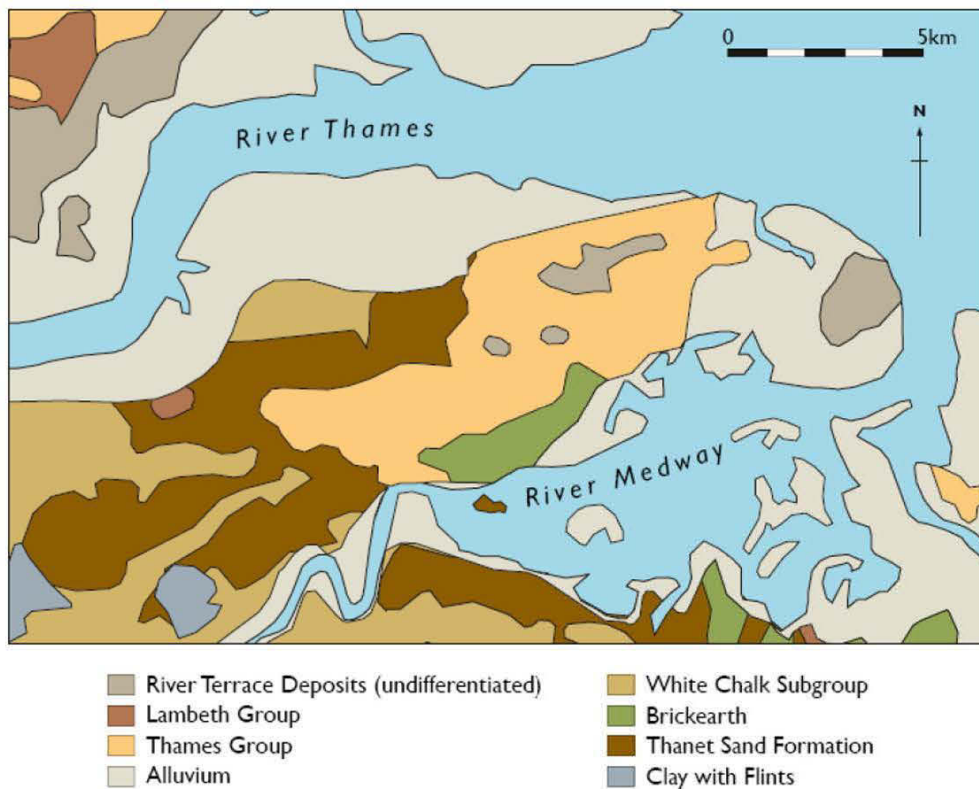


Figure 3. Superficial geology of Hoo Peninsula.

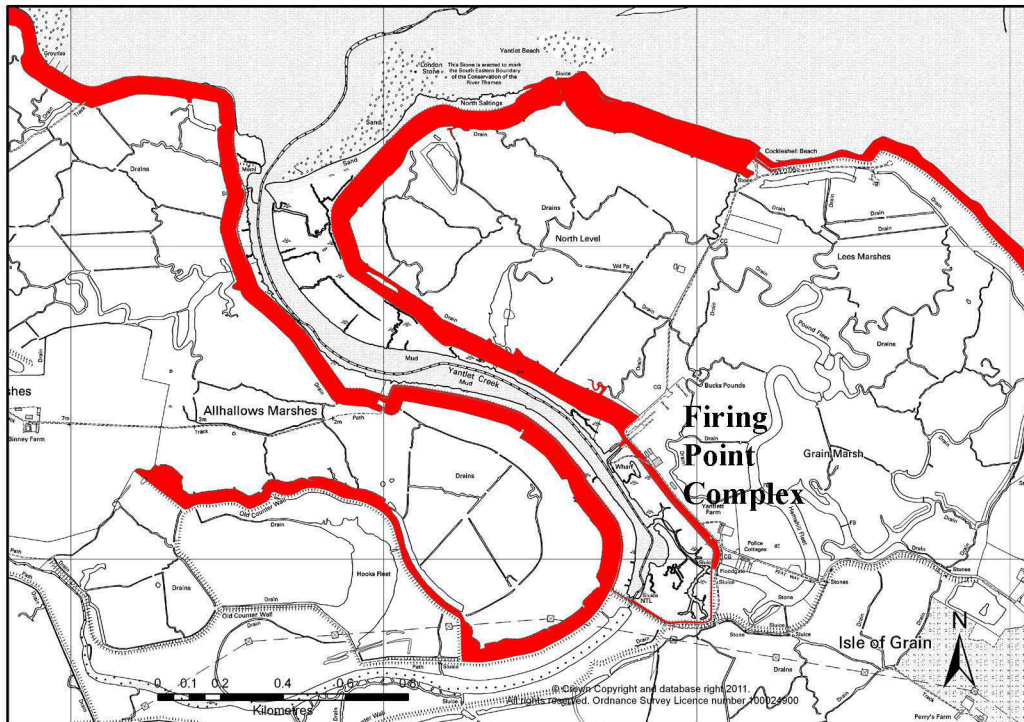


Figure 4. Seawalls and banks.

Medway sides of Hoo tend to be divided up by winding creeks, both large and small, which in the past have changed shape and moved around rapidly in a fairly fluid environment. In places these have been partly replaced by rectangular patterns of drainage ditches. The area immediately to the east of Yantlet Creek where the firing range was situated is all fairly flat low-lying marshland, with numerous pools and short winding stretches of water which at one time were creeks. Hamshill Fleet to the south and east of the site would once have joined up with Yantlet Creek, making the site effectively an island within an island. Many of the smaller creeks were partially filled in or straightened in order to lay foundations for buildings and other structures for the firing point complex.

The firing point complex was located here for good reasons – the remoteness of the site, its estuarine location, its difficulty of approach except by designated routes, its extensive areas of flat marshland, its open aspect across the Thames estuary to the north and especially the north-east, its unique position in alignment with the shoreline and sands of south-east Essex, its easy accessibility by water and rail, its marginal character. The main complex of buildings was set out along a road and railway line roughly parallel to the creek, while the gantry path was set out perpendicular to it, incorporating a substantial dock and wharf into its overall layout. Thus the complex of buildings and structures that make up the firing point has an ‘L’ or slightly unsymmetrical ‘T’ shape to it.

A flood bank about 3m high and 12m wide runs along the south-west side of the main part of the building complex, between the road and Yantlet Creek, protecting the site from flooding at high tide. Like the creek itself and the parallel road, it is oriented north-

west to south-east. This is part of a larger system of seawalls and banks which enclose Grain Marsh on south-western, western and northern sides. The Isle of Grain Firing Point complex nestles into a specially modified and narrowed stretch of bank.

Public access

The site is closed to public access. The various buildings and other structures of the former firing point, now a demolition range, are currently protected by a manned guard house and road barrier. The few footpaths that lead into the area come to dead ends where clear 'Danger' signs indicate the limits of the danger zone in which controlled explosions have taken place until recently.

Access to the Isle of Grain on foot is extremely limited due to the marshy character of much of the land and the fact that the former island is still partly bounded on its western side by Yantlet Creek and other smaller linear bodies of water. Access generally is only possible via the A228 road which leads over the former Grain Bridge (of which more will be said below) into the centre of the industrial installations. From here the B2001 leads northwards towards the small village of Grain. From the village a narrow lane leads eastwards for a distance of about one kilometre past Rose Court Farm to the southern end of the firing point complex, where the road turns to the north-west.

Method

The study has been mainly desk-based, with visits to libraries and archives, supplemented by internet research and correspondence with specialists. The Ministry of Defence gave permission for an two escorted visits around the surviving buildings and structures. These took place on Wednesday 22nd May 2013 and 22nd June 2011.

Designation and planning background

The Hoo Peninsula falls within the South East Local Enterprise area, and may be subject to major housing development and economic infrastructure projects in the near future.

The Yantlet Creek area is designated a special landscape area in the Medway Local Plan. It is also part of the South Thames Estuary and Marshes special protection area (SPA), and within the Natural Area of the Greater Thames Estuary and Site of Special Scientific Interest (SSSI).

PRINCIPAL SOURCES

Previous archaeological work

There are no scheduled monuments or listed buildings on or close to the site itself. No archaeological excavations or other investigations have been carried out in the vicinity of the site. While much archaeological work has been carried out on the Isle of Grain, none to the knowledge of the author has been conducted on the site or in the immediate vicinity of the firing point complex itself. The focus of existing work has inevitably been on those areas in the south of the Isle of Grain where industrial development has been concentrated. However, the site falls within the area covered by English Heritage's Hoo Peninsula project, which has been running since 2009. This project involves the development of a project GIS (Geographic Information System), an analytical study of the area using aerial photos, an assessment of standing buildings, and general data-gathering on the rich historic past of the Hoo. This study, targeted on the firing point complex at Yantlet Creek, forms part of that wider project, while at the same time standing on its own as an archaeological desk-based study.

SMR/HER and English Heritage AIME Records

The Kent HER (Historic Environment Record) and EH AIME records together provide a detailed record of sites of historical or archaeological interest within the local area. These give a good indication of the range of sites and the richness of the historic and archaeological landscape. Possible Bronze Age ring-ditches testify to the former presence of prehistoric people. There are several saltern mounds that are thought to be medieval but could actually date from the the Roman period through to very recent times. Many such sites could be buried under tidal silts. There are also much more extensive complexes of post-medieval saltpan ponds, interspersed with 20th-century military structures. Sites within the immediate vicinity of the former firing point are shown on Figure 5, with AIME numbers.

418685	Remains of building, unknown date
1426741	Pillbox at Rosecourt Barn, Second World War
1478317	Diver box light anti-aircraft battery, Second World War
1478318	Diver box light anti-aircraft battery, Second World War
1478319	Diver box light anti-aircraft battery, Second World War
1478320	Diver box light anti-aircraft battery, Second World War
1478321	Diver box light anti-aircraft battery, Second World War
1538991	Saltern earthwork, medieval
1538993	Saltern earthwork, medieval
1539005	Post-medieval saltpans
1539008	Saltern earthwork, medieval
1540665	Saltern earthwork, medieval
1540689	Saltern earthwork, medieval, re-used as stock refuge
1540886	Saltern earthwork, medieval

1540893	Saltern earthwork, medieval
1540902	Saltern earthwork, medieval
1540907	Saltern earthwork, medieval
1540914	Saltern earthwork, medieval
1541607	Firing point, founded 1917-18
1541609	Diver box light anti-aircraft battery, Second World War
1541658	Concrete pad or base, 20th century
1541682	Site of searchlight battery / observation post, built 1924
1542403	Sheepfold, Wilford's Pound, 19th-20th century
1542413	Sheep wash and pound, called Buck's Pound, 19th-20th century
1542417	Sheep pound, building with enclosure, 19th-20th century
1545094	Small rectangular building, 20th century
1542417	Sheep pound, building with enclosure, 19th-20th century
1542419	Sheep wash, with enclosures, 19th-20th century
1545097	Small rectangular building, 20th century
1551951	Ring-ditch, thought to be Bronze Age
1552031	Ring-ditch, thought to be Bronze Age
1552039	Ring-ditch, thought to be Bronze Age
1842409	Sheep fold, 19th-20th century
1539008	Saltern earthwork, medieval

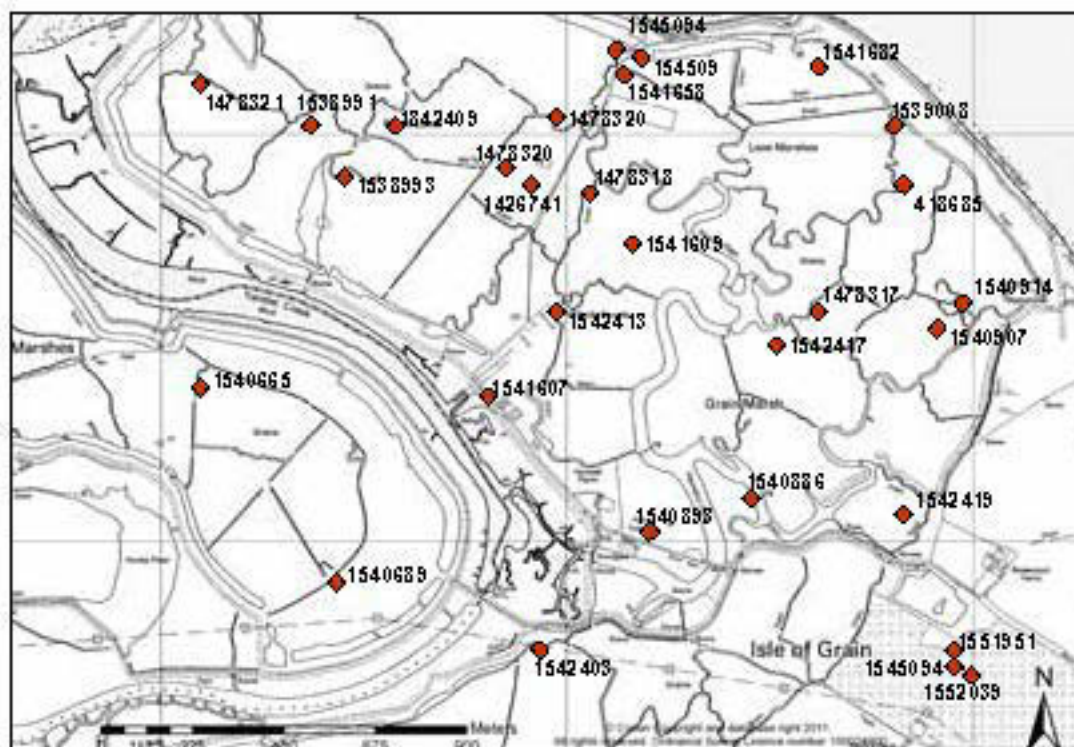


Figure 5. AIME sites within the immediate vicinity of the firing point complex.

Listed buildings

Listed buildings on the Isle of Grain are all in village of Grain or in the near vicinity of it. These are:

Church of St James, 55 High Street, Grain, Medway. Grade I

Grain Tower, Grain, Medway (an offshore structure). Grade II

The Hogarth Inn, High Street, Grain, Medway. Grade II

White House Farmhouse, Chapel Road, Grain, Medway. Grade II

Second World War Anti-Tank Obstacles on the Foreshore, Grain, Medway. Grade II

The anti-tank defences referred to above consist mainly of a 9m wide strip of dragon's teeth extending for 1060m along the shore. Another line of anti-tank cubes extend for 1250m along the coast around the north of Allhallows-on-Sea. The reason there is a gap between these lines of defences (the shore north of the firing range at Yantlet Creek) is because sufficient defence was already naturally provided by marshes and creeks.

Aerial photographs

English Heritage hold a comprehensive collection of aerial photographs, both vertical and oblique. Only a small selection of relevant images are reproduced in this report. The most useful is a vertical black and white photograph taken in 1946 while the firing point was still in active use. Although the internal railway had gone out of use by then, nearly all of the buildings and other structures survived. That photo therefore provides an indispensable guide to what has been lost. It is reproduced elsewhere in the report (Figures 19 and 20).

An oblique black and white photo taken of the Hoo Peninsula in 1950 (Figure 6) gives a somewhat grainy picture of the principal and most visually striking structures, the velocity screen masts, shortly before they were taken down during the 1950s. These structures have subsequently often been misidentified on aerial photographs as radio masts.

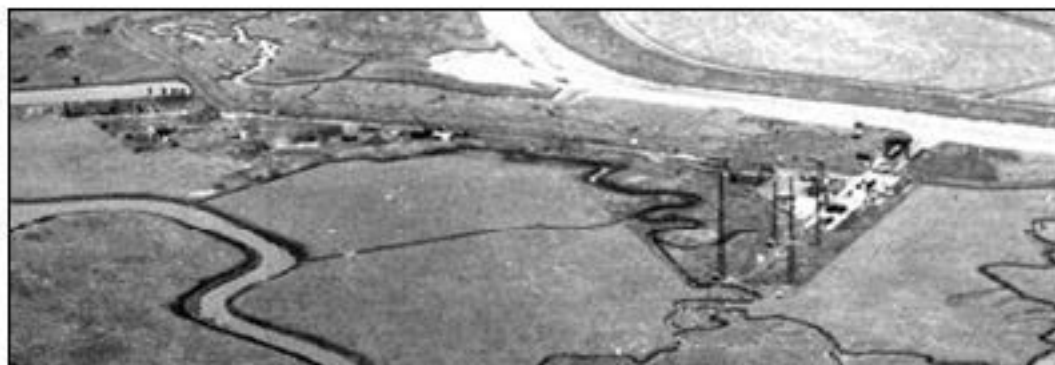


Figure 6. Detail from RAF TQ877777 30-Jul-1950 © English Heritage Photography.



Figure 7. Aerial photograph of remains of Grain Island Firing Point, amidst marshlands and creeks April, 1996. NMR ADA/ 693/ 26941/ V/ 194. © English Heritage Photography.



Figure 8. Detail of 1996 aerial photo.



Figure 9. Further detail showing wharf and dock.

Figures 7-9 illustrate the depth of detail contained in aerial photos. They also provide evidence of the textural depth of the site itself, with survival of archaeological patterning and structure from different periods at a range of scales. As well as surviving structures and buildings of the firing point, traces of recent activities associated with the later demolition range are also clearly visible. In Figures 8 and 9, something of the stratigraphy of the site begins to become apparent, with sections of the present flood bank seen to overlie the earlier gantry path. In Figure 9, the superstructure of the timber wharf alongside the creek is discernible, and a small dock (with a boat in it) can be made out parallel with and some distance to the south of the main dock. If it had not been for the aerial photograph, the existence of this smaller wharf would probably not have been noted, as it was not seen during the site visit. Also discernible are the small embankments and stretches of consolidated ground that once formed the raised linear platforms for the internal railway network.

LIDAR

LIDAR is a form of optical remote sensing increasingly used by archaeologists to map slight changes in ground height. It facilitates the visualisation of buried archaeological and natural features in the form of slight depressions or raised areas not easily seen from the ground. Here it is particularly useful for showing the networks of meandering creeks, some of which have been artificially straightened. Other features that show up well are saltern mounds - some of which, as already discussed, are likely to be medieval in date. These include the prominent mound in the field to the east of the police cottages, but there are many other probable salterns visible in Figure 10.

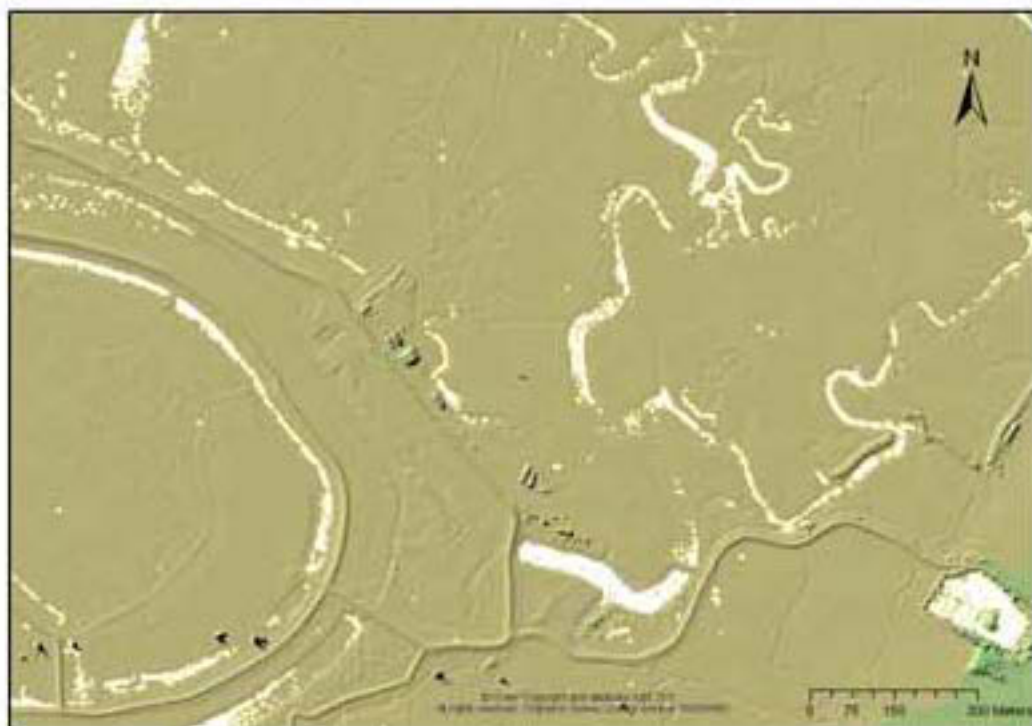


Figure 10. LIDAR survey (licensed to English Heritage for PGA through Next Perspectives™ 2012).



Figure 11. A pre-military landscape. Tithe map, 1839. Kent History & Library Centre, CTR 314B.

Maps

There is a wealth of information in the form of historical maps, and these are used as illustrations throughout the report. The aim here is to summarise the range of maps available from various sources, rather than reproduce all of them.

Given that Yantlet Creek was an important shipping channel, navigation charts from late medieval to post-medieval times are a useful resource, and it is interesting to compare the naval chart of 1540, thought to have been a personal copy belonging to Henry VIII and now in the British Library (Figure 14, next chapter) with the Creighton map of 1822, probably commissioned by the Mayor of London with a view to re-opening the channel (Figure 18, next chapter). The former shows it as open; the latter depicts it as blocked, partially silted up and effectively closed to shipping.

Other early historical maps include the detailed Russell map of 'The North West Level of the Isle of Graine' of 1694 - listing landowners and showing 'Fleets, Creeks, Rylls, Gates and Wayes' - now held in the Kent History and Library Centre archives (5/NK.P2). This shows the system of floodbanks to have already been already constructed in its basic form by the late 17th century. Some have their origins in much earlier times. Floodbanks

have been reinforced and augmented right up to the present day, and as such can be regarded as multi-period monuments, retaining their usefulness through very different periods of landscape use.

Edward Hasted's map of 1798, which accompanies his historical and topographical survey (Hasted 1798) shows some remarkably large industrial salt-production sites, one of them just to the south-west of the later firing point complex (Figures 16 and 17, next chapter).

Tithe maps produced from 1830-1840 (digitised and made easily accessible by the Kent History and Library Centre) provide much useful information about early 19th-century land use, tenancy and ownership, and thus provide a useful reference point for the pre-militarised landscape of Yantlet Creek and Grain marsh (Figure 11).

The first edition (Epoch 1) OS map from 1895 is also useful in this respect. The earliest OS map on which firing point buildings are marked is the Epoch 4 map surveyed in the 1920s.

Ground photos, living memory and oral testimony

Photos taken from the ground during the main period of use of the firing point are scarce. There are several postcards from campsites and holiday beaches at Allhallows taken during the inter-war years (Figure 12), which show the masts of the firing point in



Figure 12. Postcard of Allhallows Beach and campsite, late 1920s or early 1930s, with Yantlet Creek and the velocity screen masts of Grain Island Firing Point in the background. It is probable that the sound and sight of guns being fired was itself part of the attraction to some tourists, while perhaps deterring others. Medway City Ark, DE 402 / 24 / 2 (L).



Figure 13. Firing at Gantry Battery, New Ranges, Shoeburyness.

the distance, but level of detail and resolution is low. It is quite possible and indeed likely, however that unknown collections of photographs exist and remain to be discovered.

Diaries, notebooks, photo collections, and other forms of personal memoirs, perhaps in the hands of individuals and not yet part of main archive collections, could be a key resource in elucidating more about how the site was used. In the evocative image of artillery shells being fired through velocity screens (Figure 13), probably at Gantry Battery on the Shoeburyness range, the howitzer gun is smaller than the ones that were tested at Yantlet. There may be former members of the armed forces with memories of working at the latter firing point, or children of that generation might also have valuable recollections.

Some information of this nature can be gleaned from online history forums, such as the following extract

After WW2 my father was posted from P&EE Shoeburyness to Yantlet as a sergeant in the Royal Artillery...When the naval guns were fired, every building in Grain shook. They were still testing these guns in the early 1950s...I remember walking along the railway line which curved around the northern boundary of the refinery to join up with the Hundred of Hoo line,, the land at Yantlet was very low. It was protected by sea walls but would occasionally flood, isolating residents from the rest of Grain.

Entry by 'Pepex', Kent History Forum, posted April 5th, 2010.

Archives

Archives consulted during the course of this study include the Kent History and Library Centre in Maidstone, the Medway City Ark in Strood, the British Library, the London Metropolitan Archives, the English Heritage National Monument Record and the National Archives at Kew.

Documents relating to Admiralty activity in and near Yantlet Creek go back at least to 1901, when a look-out post was built on the sea-wall (City Ark S_NK_AG150). Official War Office correspondence relating to the building and development of the firing point complex can be found in several archives. Some of the most important archived information is in the form of architectural drawings held in The National Archives (TNA WO/78/4370). These were originally made in 1920 prior to construction but also show additional corrections made in 1923 after construction. In the same collection of War Office papers is a detailed plan of the firing point (TNA WO/78/5129), which is the main reference point for determining the functions of individual buildings within the complex. Some of these drawings and plans will be explored later in the report.

ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

Prehistoric and Roman (to AD 410)

There is a background of prehistoric and Roman settlement on Grain, but no sites or monuments from this period have been identified in the vicinity of the firing point.

Anglo-Saxon (410-1066)

Little is known of the Isle of Grain in the Anglo-Saxon period, though it can be assumed that the area was inhabited and its resources utilised. Use of Yantlet Creek as a shipping channel probably extends back to this period, if not to Roman times. The Thames estuary figured in accounts of the wars between Saxons and Vikings, with the battle of Benfleet and the subsequent withdrawal of Hæsten's forces to the Viking encampment at Shoeburyness recorded in the Anglo-Saxon Chronicle entry for AD 894. The village and church of St James (now Grain village) is of Anglo-Saxon origin.

Medieval (AD 1066-1540)

The Isle of Grain is not mentioned in the Domesday Survey, but the placename appears as Grea, Gryen and Gren in other ancient documents such as the *Textus Roffensis* (the Book of the Church of Rochester) of 1123. The word 'grain' derives from the Old English for 'gravel'.



Figure 14. Detail from chart of Thames estuary, 1540. British Library Board. Cotton Augustus.

Grain had just the one parish of St James, centred on the church of that name. The Grade I listed church of St James in the village probably existed in Late Saxon times but was largely rebuilt in the 12th century. The village was called St James in the Isle of Grain, following the usual custom in these parts, but is now usually known by the shorter name of Grain village.

Because of the marshy character of the land, Grain had a higher than normal incidence of malaria or marsh fever throughout the medieval and post-medieval periods.

One of the most important medieval industries making use of the salt marsh as a resource was salt production. Numerous saltern mounds survive as standing earthworks in the vicinity of the firing point, especially on Grain Marsh to the



Figure 15. Low sub-circular earthwork in field to north-east of police cottages, showing up as a darker area in the midst of lighter grasses, and thought to be a medieval saltern mound.

northwest. One of these (NMR 154 0893; NGR TQ 8725 7704) is visible in the field to the north of the road on the approaches to the firing point (Figure 15). It measures approximately 35 x 25m in plan and up to 1.50m in height. This example has the characteristic 'doughnut' shape of medieval salterns, with a deep central hollow, standing apparently on its own within the field. Other salterns in the vicinity have 'lobes' to the outer encircling mound, and occur in clusters.

The process that took place in the central working area, giving rise to the build-up of surrounding mounds of material, was known as 'bleeching'. Following high tides salt-impregnated sands and silts from the shore were scraped into heaps and taken to troughs where they were filtered by pouring water through them. The concentrated liquid was heated in lead pans to bring about evaporation, producing salt crystals as an end product. The encircling mound was largely derived from the gradual accumulation of bleached silts left over from the production process and dumped nearby.

The various steps involved in the process are described in some detail by Victoria Ridgeway in her account of the results of excavation of the saltern mound found buried under alluvial deposits at Brampton in Sussex (2000). Although she refers specifically to salt production practices in Sussex these were probably not all that different from those deployed on the Isle of Grain. For the wider context and landscape setting of salterns in the Adur valley, Sussex, see Holden and Hudson (1981).

As none of the salterns next to Yantlet Creek have been systematically excavated the one at Brampton serves as a good comparative example. The situation of the mound on low-lying ground next to the strongly tidal River Adur is broadly similar to that at Yantlet. Excavations revealed it to have been in use as a salt-production site from the 13th to the 16th century. Earlier phases consisted of a gravel surface, hearth, well, tank and midden in the centre of an encircling bank. A ditch may have brought freshwater to the site for use

in the production process. Later phases involved construction of a rectangular building and the digging of pits which were found to contain medieval pottery (Ridgeway 2000).

It is easy to discount salterns as relatively unimportant but in actual fact such earthworks are archaeologically rich forms of evidence for what was once a vital medieval industry. Under excavation a fairly compact complex of features might be expected to be found, representing the 'taskscape' of salt production as carried out at that time. Salterns need not necessarily be regarded as discrete sites as they were linked to their surrounding area through ditches (bringing supplies of fresh water from springs) and paths (for transporting raw materials and fuel). On a broader scale, they would have been linked in with a regional and national network of salt-ways. The end of the medieval phase of salt-production, characterised by saltern earthworks, probably coincided with extensive embanking of both sides of Yantlet Creek and the construction of sea-walls on the estuarine shore.

Because of their shape, many medieval salterns get re-used as convenient sheepfolds or other animal enclosures. For example, a sheepfold just to the northeast of the 20th century gantry path (and marked as Bucks Pounds on the modern OS map) may have been partly adapted from a saltern mound. It is worth noting that some salterns may have been destroyed by processes of erosion associated with tidal flows and the movement of creek meanders through time, while others may have been completely buried under alluvial silts, like the Brampton example.

Other industries in the area included fishing, harvesting of oyster-beds, arable and animal farming, water transportation, and so on. The shifting topography of creeks and inlet and the geographical situation of Grain at the mouth of the Thames and Medway inevitably also made the area a centre for smuggling – an important though clandestine part of the local economy.

Yantlet Creek as navigation channel

In late medieval times, and perhaps earlier, Yantlet Creek (sometimes known as the Stray) was the "usual passage for all vessels to and from London, which thereby avoided the more exposed and longer navigation round the outside of this island" (Hasted 1798). Ships also made use of the Swale as a navigation channel between the mainland and the Isle of Sheppey (refer back to Figure 14).

The Yantlet line across the estuary presently marked by the London Stone near the mouth of Yantlet Creek and the Crow Stone on the opposite shore in Southend has been in place since 1285, when a charter of Edward I explicitly stated that London was responsible for conservancy of the river up to Yantlet. As a later Act of Henry VII expressed it, "the Mayor of London should have the rule of the River Thames from the Bridge of Staines to the waters of Yendall and Medway" (cited in Gurney 1824).

Given that Yantlet Creek has been used as a major navigation channel for London probably since Roman times, and certainly throughout the medieval and much of the post-medieval period, there is immense archaeological potential for preservation of

boats, wharfs, and other artefacts and structures of maritime archaeology, including those of prehistoric periods. This applies not only to the main channel as it is now but to the former channels and side creeks which have since silted up.

Post-medieval period (1540-1917)

A description of the Isle of Grain in 1824 makes a clear distinction between salt marsh on the one hand, "meaning that land which the tide sometimes covers", and freshwater marsh on the other hand, "which is indosed within sea walls, which prevent the access of salt water over the land". It is added that there is also "a considerable tract of arable land which is highly cultivated" (Gurney 1824: 8).

Industrialised salt production

Just to the south-west of the guardhouse and police cottages is a substantial complex of features showing as cropmarks on aerial photographs, and covering an area of about 20 hectares (centred on NGR 86719 76526). This corresponds to one of two industrial complexes of salt-pans on the Isle of Grain depicted on the 1798 map (the other is on a distributary channel of Yantlet Creek near the shore of the Medway in the south of the island). The site is laid out in grids of shallow ponds each measuring about 115m x 95m, with the whole complex measuring over 600m x 350m. For comparative scale, it is useful to imagine 14 football fields side by side. At the northeast end is a windmill that would have been used to pump brine from one pond to another (Figures 16 and 17)

A comparable series of smaller rectangular ponds set out in a grid layout and still visible as earthworks (but not marked on the Hasted map) has been observed at Rosecourt Barn to the north of the firing point complex (NGR 86933 77936).

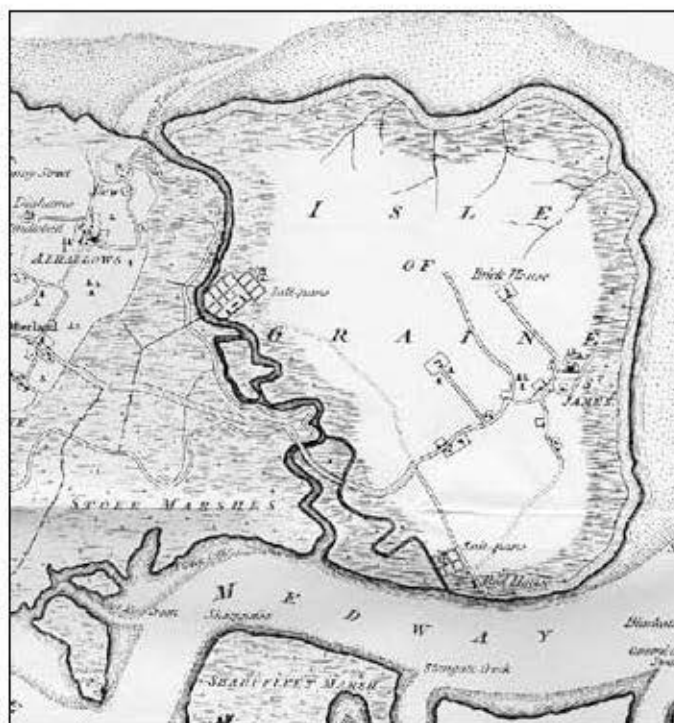


Figure 16 (left) The Isle of Grain from a map of Hoo by Edward Hasted, 1798, showing two centres of industrial saltpanning. One is near the southern shore; the other is on the east bank of Yantlet Creek.

Figure 17 (below) Detail of 1798 map, showing windmill and salt-pans.



There is a detailed eye-witness account of the post-medieval salt-making process. In the extract below, the traveller and writer Celia Fiennes portrays the extensive salt-workings she visited in 1698 at Lymington in Hampshire, pointing out some of the material culture associated with the activities involved (probably very similar to those at Yantlet Creek on the Isle of Grain).

The Sea water they draw into Trenches and so into Severall ponds yt are secured in thate bottom to retain it, and it stands for the Sun to Exhale the Watry fresh part of it, and if it prove a drye summer they make the best and most Salt, for the raine spoyles the ponds by weakning the Salt. When they think its fit to boyle they draw off the water from the ponds by pipes wch Conveys it into a house full of Large Square Iron and Copper panns; they are shallow but they are a yard or two if not more Square, these are fixed in Rowes one by another it may be twenty on a Side, in a house under which is the ffurnace yt burns fiercely to keepe these panns boyling apace, and as it Candy's about the Edges or bottom so they Shovell it up and fill it in great Baskets and so the thinner part runs through on Moulds they set to Catch it, wch they Call Salt Cakes. The rest in the Baskets drye and is very good Salt and as fast as they Shovell out the boyling Salt out of the panns they do replenish it wth more of their Salt water in their pipes....

...Their Season for makeing Salt is not above 4 or 5 Months in the year and yt only in a dry Summer. These houses have above 20 some 30 others more of these panns in them, they are Made of Copper. They are very Carefull to keep their ponds well secured and Mended by good Clay and Gravell in the bottom and Sides and so by sluices they fill them out of the sea at high-tides and so Conveyed from pond to pond till fit to boyle.

Celia Fiennes 1888 (1702)

The account illustrates several important aspects of the saltmaking process, including the fact that it was a seasonal and labour-intensive activity, relying to a large extent on utilisation of solar power to evaporate water from the rectangular ponds. Furnaces were used to heat the pans in order to process further the brine and extract salt. Fiennes grasped the crucial role played by the sluices via which ponds and connecting channels were linked to the tidal river or estuary, together with the equally critical role played by the tides in filling the ponds. This was an industry that was remarkably in touch with seasonal, tidal and meteorological rhythms – making use of solar, tide and wind power simultaneously.

In the case of the Yantlet Creek salt pans, the ponds nearest the creek would have been used to capture seawater at high tide. The ones further away were shallower evaporation ponds, perhaps no more than one foot deep, connected together by a system of leats and sluices. A windmill is shown at the northeast end of the series of ponds. This would have been used to pump brine from the ponds into an elevated holding tank, from which it was directed through pipes to the boiling house, where metal pans were heated over coal fires, subjecting the brine to further evaporation. There is a rectangular compound about 350m x 100m along the southeast side of the complex which appears

to show several buildings within it. At least one of these would probably have been the boiling house. Other buildings may have been used to store fuel for the furnace fires, or temporarily to house the salt crystals which were the end-products of the whole process. There would probably have been timber wharfs on the bank of the creek to bring in coal for the furnace fires, as well as to take away the many hundreds of tons of salt which were produced. A large team of up to 60-70 men could have been employed here during the summer season. The industry went into decline in the mid-19th century, as higher taxes began to be levied on profits: production of sea salt by evaporation was largely replaced by rock salt mined in Cheshire.

After the decline of the industrial production site, the practice of salt working continued on a smaller scale, perhaps going back to extraction of salt from salt-impregnated sands and silts scraped up from the shore. Some salterns are marked next to the creek but outside the flood banks on early OS maps.

The Yantlet Creek trial of 1824

Over three days from 25th-27th August 1824 a trial was held in Guildford summer assizes in which the issue of whether Yantlet Creek was an ancient navigation channel was discussed in great detail. A report of the trial (Gurney 1824) helps settle the question of how Yantlet Creek was transformed from a navigable channel linking the Thames and Medway to the half-silted up and discontinuous channel it is now. The information that comes out of the trial provides a historical background for the later re-use of Yantlet Creek in transporting large guns to and from the firing point.

The incident that initiated the court case occurred on 7th September 1822. Seven or eight barges full of labourers sailed from London into Colemouth Creek on the River Medway. Directed by a surveyor and solicitor, they proceeded to cut a channel over half a mile long to link Colemouth Creek with Yantlet Creek. In the process they cut through the causeway that carried the road from Stoke to Grain at the place called Grain Bridge. A parish surveyor from Grain remonstrated and stood his ground, but the diggers carried on using their picks all around him, so that he ended up standing on a pillar of unexcavated ground in the midst of the newly-dug channel.

The rough channel they dug was later widened and dredged to 20 feet wide and 5 feet deep. Then on the 4th October 1822 a 12 ton barge called 'Sea Horse' flying a City of London flag, was pulled along the newly established waterway link to demonstrate its navigable status.

A plan of 1822, probably commissioned by the City of London, shows the causeway immediately prior to the act of cutting through it. A substantial dam-like feature is depicted, with the road running along the top. The great width of Colemouth Creek to the south can be compared to the extreme narrowness of Yantlet Creek to the north. The fact that Yantlet Creek had silted up and narrowed so dramatically in the space of a few decades demonstrates the extent to which it must have formerly been regularly maintained through dedging and widening in order to keep the shipping channel open.

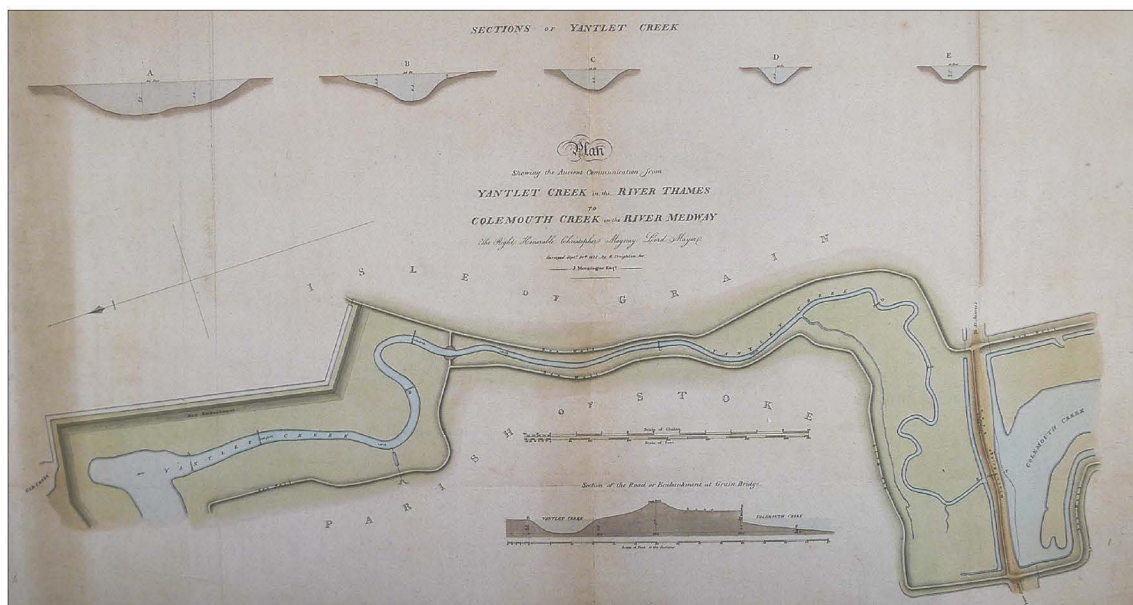


Figure 18. Map of Yantlet Creek in 1822 by R. Creighton. Pen and wash on paper. City of London, London Metropolitan Archives K1247493. North is to the left.

Seven men were prosecuted at the Guildford court for cutting the channel through the road – “the land-way sacrificed for the water-way” – though it was understood by all that they were acting on behalf of the City of London and under the orders of the Lord Mayor. The prosecution claimed that the City of London had no jurisdiction over Yantlet Creek and that it had never been a navigable waterway – at least within living memory. The road across the causeway was an “ancient and immemorial road for land carriage”.

The counsel for the defence, on the other hand, argued that Yantlet Creek and Colemouth Creek were once parts of a single navigable waterway, which separated the Isle of Grain from the rest of the Hoo peninsular. They summoned a number of aged witnesses who remembered sailing all the way through from Yantlet to Colemouth. All these testimonies related to a time at the very limits of living memory, dating the initial construction of the causeway to about 1760, though it was raised in height a number of times since. The building and subsequent consolidation of the causeway, it was argued, created an obstruction to flow which led to narrowing and silting up of parts of the creek.

Material evidence to support this latter view was encountered in the form of the in-situ foundations of a bridge, found while digging the channel through the causeway. This was described as stone abutments either side of the channel, as well as worked stones from the arch buried underneath materials used in the construction of the causeway. Given the material evidence (some of the masonry blocks were brought into court), the existence of the bridge was not disputed. What was disputed was its form and date. While the prosecuting counsel tried to claim it was of Saxon date and rude design, the defence argued that its single pointed arch (deduced from the curvature of masonry blocks recovered) was similar to arches of other recent bridges on the Thames and Medway, no more than 300 years old.

The defence counsel successfully showed that the bridge existed in recent history if not in living memory, that it was designed to allow boat traffic under it as well as road traffic over it, and that Yantlet Creek and Colemouth Creek were once parts of the same watercourse. Even so, the judge ruled that the City of London had effectively ceded all rights of navigation through the channel by not maintaining or using it for a period of decades. The seven men were found guilty. A retrial was subsequently ordered, but the report does not record the outcome. It is thought that the Yantlet navigation stayed open for at least 10 years, before the causeway and road was reinstated due to continuing protests from local residents and farmers.

Leaving aside the particulars of the case, the historical sequence of human-environment interactions revealed by the trial can be summarised as follows:

- Prior to about 1760, Yantlet Creek (on the Thames) and Colemouth Creek (on the Medway) once formed a single watercourse, separating the Isle of Grain from the rest of the Hoo peninsula and providing a shipping channel from the Thames to the Medway under the conservancy of the City of London.
- A substantial stone bridge, known as Grain Bridge, crossed the creek. Its single arch facilitated both the passage of boats under the road, and the passage of road traffic over the water. The tides from the Thames and those from the Medway met somewhere in the vicinity of the bridge.
- The bridge collapsed and/or was taken down at some time prior to 1760, perhaps due to damage from high tides. It was replaced by a causeway. At first the causeway may have been more like a ford, allowing boats to be floated over it at high tide.
- Over several decades the causeway was raised successively higher until it effectively blocked the waterway entirely.
- Due to the blockage, parts of the channel silted up. Yantlet Creek and Colemouth Creek now came to be perceived by locals as two separate watercourses - though the City of London retained knowledge of it as a single watercourse and believed it had rights of navigation through it.
- A channel half a mile long was forcibly cut to reopen the navigation in 1822, removing the causeway.

The causeway at Grain Bridge was reinstated within about 10 years, partly as a result of protests from local communities about the loss of the road crossing. From the time of road reinstatement, Yantlet Creek ceased to be thought of as a major shipping route or navigation channel, and the City of London effectively gave up claims to it. The same processes of silting up and narrowing that occurred before started up again and continued up to the present day. As a result of this, the Isle of Grain was no longer an island and accordingly it soon began to be described in topographical dictionaries as being in the Hundred of Hoo. From about the mid-19th century it was effectively perceived as an integral part of the Hoo Peninsula rather than as separate from it.

The narrative of the 1824 trial is interesting for what it reveals not only about landscapes and waterscapes at that time, but also the inhabitants of the area and the activities they were engaged in. Farmers, fishermen, boatmen and other local inhabitants and workers were called to give evidence. There are incidental references to salt workings, oyster-beds, agricultural practices, smuggling of contraband, and so on, as well as passing mentions of the rich ecology of the area. Flounders, eels, herrings and lobster were all caught in the creek. Oyster-beds are mentioned. It is also stated that the mouth of Yantlet Creek, protected by a sand-bar at that time, could provide a safe anchorage for up to 50 vessels of small to medium size during storms.

The London Stone and the Yantlet Line

Beside the mouth and on the east side of Yantlet Creek (NGR TQ 860 785) is a monument known as the London Stone – in fact one of a series of London Stones positioned at various places on the shore of the Thames and Medway to mark the limits of the jurisdiction of the City of London.

The monument is 8m tall, raised up as high as possible in order to be clearly visible to passing ships. The main column may be medieval, and the inscription on it is illegible, but an inscription on the plinth lists those who re-erected the stone in the late 19th century.

The downstream limit of the City's rights over the river and duties of conservancy is 54 km from London Bridge as the crow flies and is marked on both banks of the river. The London Stone by Yantlet Creek is paired with the Crow Stone on the opposite shore of the estuary in Southend-on-Sea at TQ 857 852. Together the two stones mark a north-south line across the estuary known as the Yantlet Line (not to be confused with the Grain Range Line, which is a line of fire). One of the London Stones on the Medway carries the inscription "God Preserve the City of London" (Blundell 1965). The question of whether Yantlet Creek itself was part of the area under conservancy of the City of London was a matter of dispute in the trial of 1824 (summarised below). The Yantlet Line still marks the limit of jurisdiction of the Port of London Authority (PLA).

In 1901 the Admiralty sought permission to construct a timber look-out post, raised on piles, on the inner side of flood bank near the mouth of Yantlet Creek on its east side (Kent History and Library Centre archives S/NK/ACI/50).

Shoeburyness Experimental Station

Up until the 1840s, Plumstead Marshes in Woolwich provided the principal location for practice firing and artillery trials. However, the dangers resulting from increased boat traffic on the River Thames combined with the greater range of weapons being tested made the acquisition of a new site essential. Another testing range at Sandwich in Kent was closed to further development. Land was first purchased at Shoeburyness, Essex, by the Board of Ordnance in 1849. The remoteness of the site was a major factor in its selection, along with its easy access from Woolwich Arsenal. A practice range was set up for the firing of smooth-bored muzzle loading guns (Hill 1999, 12). First used as a temporary station, it was established as a permanent garrison by 1854, in the context

of the Crimean War and the urgent need for more powerful and effective artillery. A dedicated School of Gunnery was set up in 1859, with the site expanded to over 200 acres in size. In 1905 it became independent and was known as the 'Experimental Branch' and from 1920 as the 'Experimental Establishment' ('XP' for short). In the two world wars it played a key role in artillery design and development, with gun trials making use of New Ranges. For a full account of the history of artillery trials on the site, see Hill (1999).

The history of Shoeburyness is an important consideration in writing the history of the firing point. Even though on the other side of the estuary, Yantlet was essentially an 'out' battery of the Shoeburyness establishment (Hill 1999, 145-6). Staff travelled from Shoeburyness to Yantlet by barge or rail when long range gun trials were to take place. Other staff from Shoeburyness would have been involved in observation and measurement of the trajectory and landing of shells along the southeast Essex coast. The out-battery was necessitated by the ever-increasing range of modern weaponry. Firing of shells across the estuary from Yantlet was an inevitable progression from, and expansion of, operations taking place on New Ranges at Shoeburyness.



Figure 19. Aerial photograph of Grain Island Firing Point, 1946. RAF 106/UK/1444 4014 01-MAY-1946 © English Heritage RAF Photography.

Modern period (1917 to present)

Grain Island Firing Point and the Grain Range Line

In 1917, towards the end of the First World War, the Admiralty requisitioned marshland at Yantlet, but development of the site was carried on by the War Office, which drew up a detailed set of plans for firing point buildings and structures in 1920, including an internal railway and wharf. This work was overseen by the Ordnance Committee. The layout of the site was mainly orientated around a south-west/ north-east axis, aligning with the shoreline of south-east Essex and the open sea beyond - the so-called Grain Range Line - while also making use of the natural harbourage provided by Yantlet Creek. The site was called the Grain Island Firing Point on 1920s plans, but it was also referred to as the Yantlet Battery. It was used as a firing point throughout the inter-war period and the Second World War right up into the 1950s. The complex of buildings will be described more fully in following chapters.

Recent silting-up of Yantlet Creek

The accumulation of silt and associated partial blocking of Yantlet Creek was noted in a Works Committee report of 1904 (City Ark S_NK_ACI_57). To the south of the firing point complex, an artificially constructed stretch of the creek used to flow along the side of what is now the National Grid's LNG facility. Today, however, the creek takes another course westwards from this point, gradually petering out after about 1.5 km. In effect, the whole of the middle section of the creek has been blocked and diverted, the former connection with Colemouth Creek lost for the foreseeable future.

Plans have recently been formulated to restore Yantlet Creek to its 'natural' course, linked to creation of additional wetlands and restoration of existing ones, as well as the building of a new road bridge at Grain Bridge (Green Cluster Studies 2008). Some of the themes discussed in the 1824 trial are revisited in the plans, which presuppose the existence of a clearly discernible 'natural' course of the creek. In actual fact the course of the creek has been so greatly modified by people in the past that pristine or unaltered courses would be hard to find. Given its status as a major navigation channel from at least the 13th century (and probably much earlier), there has been a substantial amount of straightening, widening and dredging, not to mention the digging of short-cuts between meanders, in order to keep shipping times to the minimum and to keep the channel open. Major interventions in the flow of the creek were also made in connection with the post-medieval salt production industry, which relied on tidal influxes of water from the creek. Any attempt to restore the creek would inevitably have to make use of semi-artificial channels as opposed to wholly natural ones, and to make somewhat arbitrary choices as to which of several alternative channels was the 'original' or 'natural' course.

DESCRIPTION OF SURVIVING REMAINS

The firing point complex at Yantlet Creek consists of a range of structures, set out in an 'L' formation on the low flat marshland next to the creek. The following figure sets out to show the extent of that which has been lost as well as that which survives - with standing remains seen in relation to the totality of the site as it was while still at least partially in use in the 1940s. Some of the buildings on the 1946 aerial photo (workmen's quarters, magazine hut, etc) and much associated infrastructure (railway tracks, paths, etc) and superstructure (travelling crane, velocity screens masts, etc) have been demolished or removed. Buildings that still stand are shown in yellow. Concrete bases and platforms are shown in blue. Modern agricultural sheds and other recent buildings are not shown. Anything not highlighted in colour is no longer visible in the landscape as an outstanding structure or feature, though traces may survive in buried archaeological form (Figure 20).

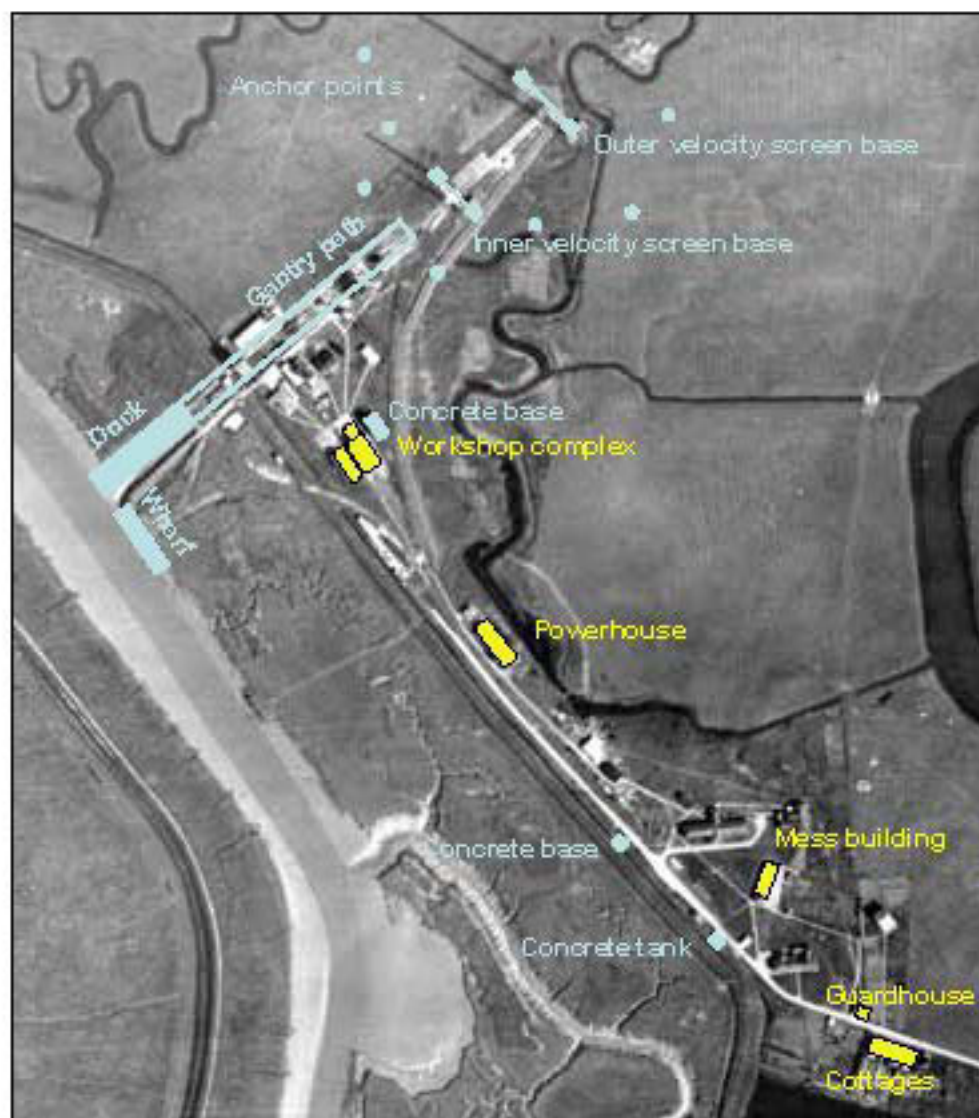


Figure 20. Surviving structures marked in colour on 1946 aerial photograph. RAF 106/ UK/1444 4014 01-MAY-1946 © English Heritage RAF Photography.

Figure 20 can be used as a rough guide and accompaniment to the following description of the site. Structures and layouts are described in the order encountered after approaching and entering the southeastern part of the site along the lane from the direction of Grain village, then proceeding northwards. Outlying structures outside of the main complex are described last, and their location will be shown on a separate figure.

Row of cottages

(NGR TQ 87138 77001 to TQ 87162 76991)

Built in the 1930s, this terrace of four salient end cottages is oriented roughly east-west and runs parallel with and facing onto the lane, with small front gardens (Figures 21 and 22). The cottages have hipped roofs and red-bricked chimney stacks. Walls are roughcast rendered, with blind east and west elevations. The whole row measures approximately 26 x 8m in ground plan.

The cottages housed security personnel and are sometimes described as 'Police Cottages'. The guard house is only a short distance away on the other side of the road, and the cottages are located outside of the entrance barrier. Not marked on 1920s plans, they were built in the early 1930s. The two-storey canted bays are unusually at the back rather than the front of the building, illustrating the extent to which the buildings were oriented away from the road and towards the water, or perhaps towards the railway firing point on the other side. Back gardens of the cottages back onto Hamshill Fleet, where a series of small jetties gave access to the water. Small boats moored here would have given quick access to other parts of the site, and it is interesting to speculate whether a channel was cut through the railway causeway, giving direct access onto Yantlet Creek. The cottages are still inhabited, and are the first buildings encountered by the visitor before reaching the road block and guardhouse at the present entrance to the range.



Figure 21. Row of police cottages and guardhouse from the east, as seen from the road approaches.



Figure 22. Frontage of police cottages, viewed from the northwest.



Figure 23. Back of row of police cottages, viewed from the south across Hamshill Fleet.



Figure 24. Guardhouse and barrier from the southeast.

Guardhouse

(NGR TQ 87152 77000)

This small single-storeyed guard-house dates from the 1930s. Only a gate is shown on the 1920s map. The building measures approximately 4m x 3m in ground plan. It is located to the north of the lane next to a road barrier and marks the entrance to the demolition range (Figures 24 and 26).

It has a red-hipped pantile roof, with red-bricked chimney stack. The brick walls are roughcast rendered with narrow windows. The south elevation has an open lobby area which serves as the entrance, to the left of which is a board detailing the range byelaws and giving a map of danger areas. The east elevation has a covered-over window which looks out along the incoming road; thus facilitating advance sighting of visitors coming up the road.

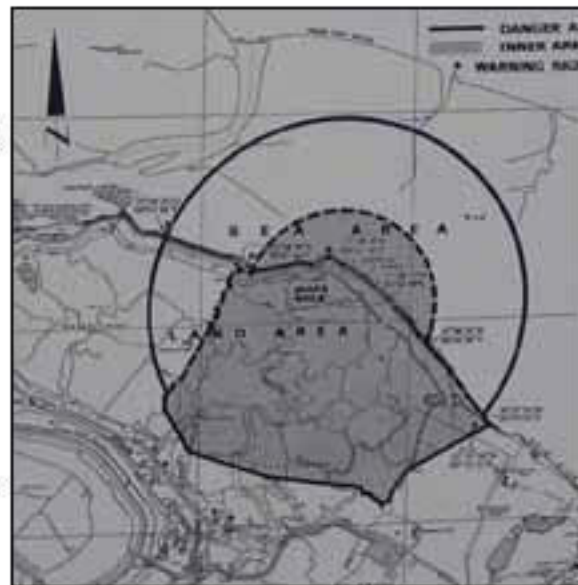


Figure 25. Close-up of map of Yantlet Demolition Range on panel to left of entrance porch of guardhouse, showing inner and outer Danger Areas. Note that the former firing point complex itself is outside the designated Danger Area.

On the left of the entrance is a panel which details the Yantlet Demolition Range Byelaws (Statutory Instruments of Defence 1976) and provides a map of the present inner and outer Danger Areas (Figure 25). These should not be taken to correspond to the areas



Figure 26. Guardhouse and barrier from the west.

of archaeological interest, or to the extent of the former firing point complex. Nearly all of the surviving structures of the former firing point are situated outside of the Danger Areas marked on the map, signifying a radical shift in the use of the site from when the firing point was in operation.

Mess building or barracks

(NGR TQ 87079 77096)

Also built in the 1930s, this single-storeyed rectangular building in 'bungalow' style with pebble-dashed walls is oriented roughly north-east/south-west and is approached by a side-lane which branches off the principal lane. It measures approximately 22m x 8 m in ground plan, with outshots. There are two blocked doorways at the back. The roof is slate-hipped, and the windows have timber-casements rising to eaves. Like the police cottages, the building is in habitable condition and currently occupied (Figure 27).



Figure 27. Former barracks and NCO rooms, from the southwest

Plans from the 1920s show this as a tennis court in the centre of a complex of buildings – including sergeants mess, officers' quarters and more barracks. The building derives its orientation from that of the court. It is described on the key to a 1933 sketch map as 'two Barracks and four NCO rooms, with toilets and ablutions'. All the surrounding buildings have since been demolished.

Concrete tank

On the other side of the main road from the barracks, and next to the road, is a concrete tank measuring 6.25 x 4.50m in plan and about 2.00m deep. Its function was probably fuel storage. It is presently fenced off (Figure 28).



Figure 28. Concrete tank next to road, looking towards the south-east.

Powerhouse

(NGR TQ 86923 77237)

The powerhouse is a single-storey building oriented north-west/south-east fronting onto the road (Figures 29 and 30). It is constructed of substantial concrete blocks and divided into three main sections. The central section is stepped out with recessed verandahs on either side in an almost symmetrical design, measuring approximately 26 x 8.5m in groundplan. Four doors of red-painted timber under concrete lintels (Figure 32) have the names and functions of rooms painted in neat yellow lettering at the top: these are, from right to left (looking towards the frontal facade), 'Battery Room', 'Generating Room', 'Engine Room' and 'Rectifier Room'. The Engine and Generating Rooms occupy the central section with the Rectifier and Battery Rooms on either side. The asbestos-tiled roof has raised louvers for ventilation. The powerhouse is shown on plans of the 1920s. It occupies a central position, and is clearly one of the most important buildings of the firing point complex from a functional point of view.



Figure 29. Powerhouse from the south.



Figure 30. Powerhouse from the north-west.

The building is currently locked and out of use except for storage, but limited views of the interior were gained through broken shuttering on the windows (Figure 31). Red square tiled floors with raised concrete platforms for machinery (now absent) were visible in some of the rooms.



Figure 31. Interior of powerhouse.



Figure 32. Detail of powerhouse doors, showing high quality of masonry and good condition of paintwork on panelled wooden doors.



Figure 33. Workshop complex from the west.

Workshop complex

Main workshop building

(NGR TQ 86849 77341)

Like the powerhouse, the main workshop building is constructed from concrete blocks and has a tiled roof. It measures 20 x 10.5m in groundplan. It is double the height of other single-storied buildings but does not have an upper floor (Figure 34).



Figure 34. Main workshop building from the north.



Figure 35. Main workshop building from the east.

The orientation of the building is north-west to south-east, parallel to the road but set back from it. The north-west gable wall has a tripartite window arrangement. The ends of eyebeams are visible on the outside of side walls, perhaps for suspending cranes. The rear elevation has six windows in a symmetrical arrangement.



Figure 36. Detail of main workshop entrance, from the south-east. Standard gauge rails are visible on the ground heading into the workshop. Also visible are narrow gauge rails apparently heading under the walls to the left of the entrance.

The entrance at the south-east end (Figures 35 and 36) is very broad and is currently closed by a half-height wooden door, but the original door probably was a sliding one. The entrance has a standard gauge railway line leading into it, branching off of the main line. A curious feature is a pair of narrow gauge lines heading straight for the wall next to the entrance: this may indicate that a narrow gauge railway preceded the laying of the standard gauge -line and its associated structures like this goods shed. However that may be, a standard gauge locomotive was housed and maintained within this building.



Figure 37. Forge, next to main workshop, from the west.

Forge

(NGR TQ 86842 77354)

Immediately to the north-west of the main workshop building is a smaller single-storey rectangular building measuring about 5 x 4m (Figure 37). It is on the same alignment and is built of the same concrete blocks as the larger building but has a roof of corrugated iron rather than tile (both buildings are set on the same concrete base). There is a raised louver for ventilation. There is a single large window on each of three sides. The door is on the south-west side, facing the road. The building is marked on a sketch map of 1933 as a forge.

Concrete base

(NGR TQ 86854 77358)

Alongside the main workshop building and smaller building and parallel to these on their north-east side is a rectangular concrete base measuring 13 x 7m (Figure 38). Aerial photos indicate that it provided the foundation of a building, though it is not marked on the 1920s map. Running along the centre and on the same alignment is an inspection pit measuring 6m x 1m and about waist deep, with three steps leading down into it at its southeastern end. Standard gauge railway lines are partially embedded in grooves in the concrete, and these go either side of the inspection pit. The line extended round from the entrance of the main workshop building. The building is marked on the 1933 sketch map as a railway engine shed.



Figure 38. Concrete base with inspection pit, formerly a railway engine shed, from the north-west.



Figure 39. Later building to south-west of main workshop, from the south.



Figure 40. Detail of the taller part of later building, from the south-west or road side. The door is on the other side, facing the main workshop building.

Later building to south-west

(NGR TQ 86838 77333)

This building is not marked on the 1924 plan, but was probably built soon after, alongside the existing main workshop. It is aligned to the other workshop buildings and the road. It has a two part arrangement (Figure 39 and 40). Significantly, the door is on the northeast side, facing the main workshop. The taller part has two bays with raised windows and a blind gable wall to the northwest. The lower part has five bays. In its entirety the building measures approximately 18 x 7m in plan. The tiled roof has a raised ridgeline for ventilation.

Gantry path, dock, and gun emplacement

The gantry path, including within its structure a dock and gun emplacement, is set at a perpendicular angle to the main road at its north-west end, in a T shaped configuration.

Gantry path

(NGR TQ 86726 77346 to TQ 86871 77462)

A gantry path consists of a linear mount for a travelling crane, in the form of a large archlike or bridgelike frame designed to move along a set of tracks. At Yantlet, all that survives are the ground-level concrete bases for the two parallel tracks, with a lowered concrete apron between them (Figure 41). Each base is approximately 190m long and 3m wide, with the single rail for the moving crane running along the inside of both bases, and railways (narrow gauge on the northwest, standard gauge on the southeast) running along the outside. The standard gauge railway tracks clearly joined up with the rest of the internal railway system, and the junction can still be seen. The bases are 10m apart, the travelling crane rails 11m apart, and the total width of the structure is 16m.



Figure 41. Gantry path, looking in north-easterly direction from bank towards gun emplacement

The tracks for the tramway (Figure 42) are narrow gauge, and would probably have had bogie wagons operating on them for moving explosive charges and other materials that were not lifted by the travelling crane. The standard gauge railway joins and runs along the southernmost of the two linear concrete bases of the gantry path, making some inter-operation of the two systems possible, though the precise details of how this worked is yet to be firmly established.



Figure 42. Detail of rails on one of the linear concrete bases of the gantry path.

Dock

(NGR TQ 86749 77361 to TQ 86723 77340)

On the south-west or creek side of the flood bank at the other end of the gantry path – 23m away from the flood bank – the structure takes on the additional function of a dock with the area between the two linear concrete bases filled with water from the creek. The inner sides of the bases are faced with timber wharfage. Above this on either side there is a series of three concrete posts for tethering ropes. The dock measures 32m x 10m, and is presumably quite deep though now partly silted up. This was the berth for the barge 'Gog', which transported heavy guns to the site from Woolwich Arsenal and Shoeburyness, towed by the steamship Katherine II.



Figure 43. Dock, from bank, looking south-west.

The docking facility allowed the travelling crane to move right over the barge for loading and unloading, taking heavy guns and gun mountings all the way from here to the gun emplacement and back again. The rail for the crane is clearly visible running alongside the dock in Figure 44.



Figure 44. Dock, looking north-east back towards bank



Figure 45. Timber wharf base, looking south-west from end of dock

Timber wharf

(NGR TQ 86738 77272 to TQ 86727 77334)

An 'L' shaped wooden superstructure (Figure 45) extends for 26m from the end of the southernmost of the two linear concrete bases forming the gantry path and dock, heading in a south-westerly direction towards Yantlet Creek. It is 3.50m wide. Upon reaching the edge of the creek it turns to run for 41m along the bank, broadening out to 6m wide to form a wharf or landing quay. The upper platform which the superstructure would have supported has gone. Here lighter equipment and materials that did not need the travelling crane could be conveniently unloaded from boats, to be loaded onto railway carriages. A branch of the railway line came directly onto one side of the wharf, as did the tramway which ran alongside the travelling crane. The wharf and dock together provided a substantial water frontage. In making full use of Yantlet Creek as a waterway for transport it continued a tradition that went back to medieval times, when this was an important navigation channel for ships taking cargo to and from London.

Gun emplacement

(NGR TQ 86848 77446)

Towards the north-east end of the gantry path there was a gun emplacement, of which little remains (Figure 46). This consists of a raised rectangular concrete base sloping up from the lower concrete surface between the two linear bases or tracks, forming a platform. It measures about 14 x 10m. There are additional raised rectangular blocks of concrete within this area. Steps lead up onto the platform from the north-west side. The details of the gun emplacement are obscured by vegetation and large caravans currently located there. It is clear that, as in the case of the dock, the gun emplacement was fully integrated into the structure of the gantry path, allowing the travelling crane to pass over it in order to lift the heavy guns in and out of position.



Figure 46. Concrete structures of the gun emplacement within the area of the gantry path.



Figure 47. Looking southeast along arm of inner and shorter velocity screen mast base.

Velocity screen mast bases

(NGR TQ 86887 77500 to TQ 8690577480, TQ 86936 77555 to TQ 86966 77523)

Two pairs of velocity screen masts were set perpendicular to the line of the gantry path, positioned 35m and 109m away from its northeast end (at a distance of 79m apart from each other). The bases for these take the form of raised rectangular concrete foundation blocks joined by linear strips of concrete flush to the ground. In the case of the near base the foundation blocks are 5m x 4m, and the linear strip between is 20m long. In the case of the far base the foundation blocks are 7.7m x 6m, and the linear strip is 35m long. On the upper face of the blocks at either end are rectangular settings with squares formed of four metal pins or bolts at each corner (Figure 48). In the case of those on the north-west side there are also circular raised bases 1m in diameter (Figures 47 and 49).



Figure 48. Looking northwest along arm of outer and longer velocity screen mast base.

The foundation blocks supported the velocity towers or masts, from which the small wire mesh velocity screens were suspended, positioned exactly according to the angle and elevation of fire so that the shells would pass through them. The basic intention of the arrangement of velocity screens was to measure the speed of shells fired from the gun emplacement – specifically the time it took for shells to pass the 79m between the two screens. The masts were 110 ft (inner) and 210 ft (outer) high.



Figure 49. Footprint of velocity screen mast on concrete base.

Anchor points for velocity screen masts

(NGR TQ 86846 77492, TQ 86860 77529, TQ 86882 77544, TQ 86899 77597, TQ 86954 77608, TQ 86886 77441, TQ 86931 77451, TQ 86948 77471, TQ 87020 77535, TQ 87001 77482)



Figure 50. Anchor point for velocity screen mast cable. The embedded metal fixing for cable attachment points towards the position of the former velocity screen mast.

Velocity screen masts were supported by a wires or cables attached to anchor points positioned around them in intersecting oval formations on nearby ground. Ten of these anchor points of various dimensions were observed. Consisting of rectangular concrete blocks embedded in the ground, with upper surfaces at ground level, anchor points range from 2.50 x 2.00m to 1.00 x 0.80m in size. Many have embedded metal spools for attaching cables protruding in the direction of the mast that was being supported (Figure 50).

Outlying installations

Associated with the main firing point complex are a series of outlying installations (Figure 51).

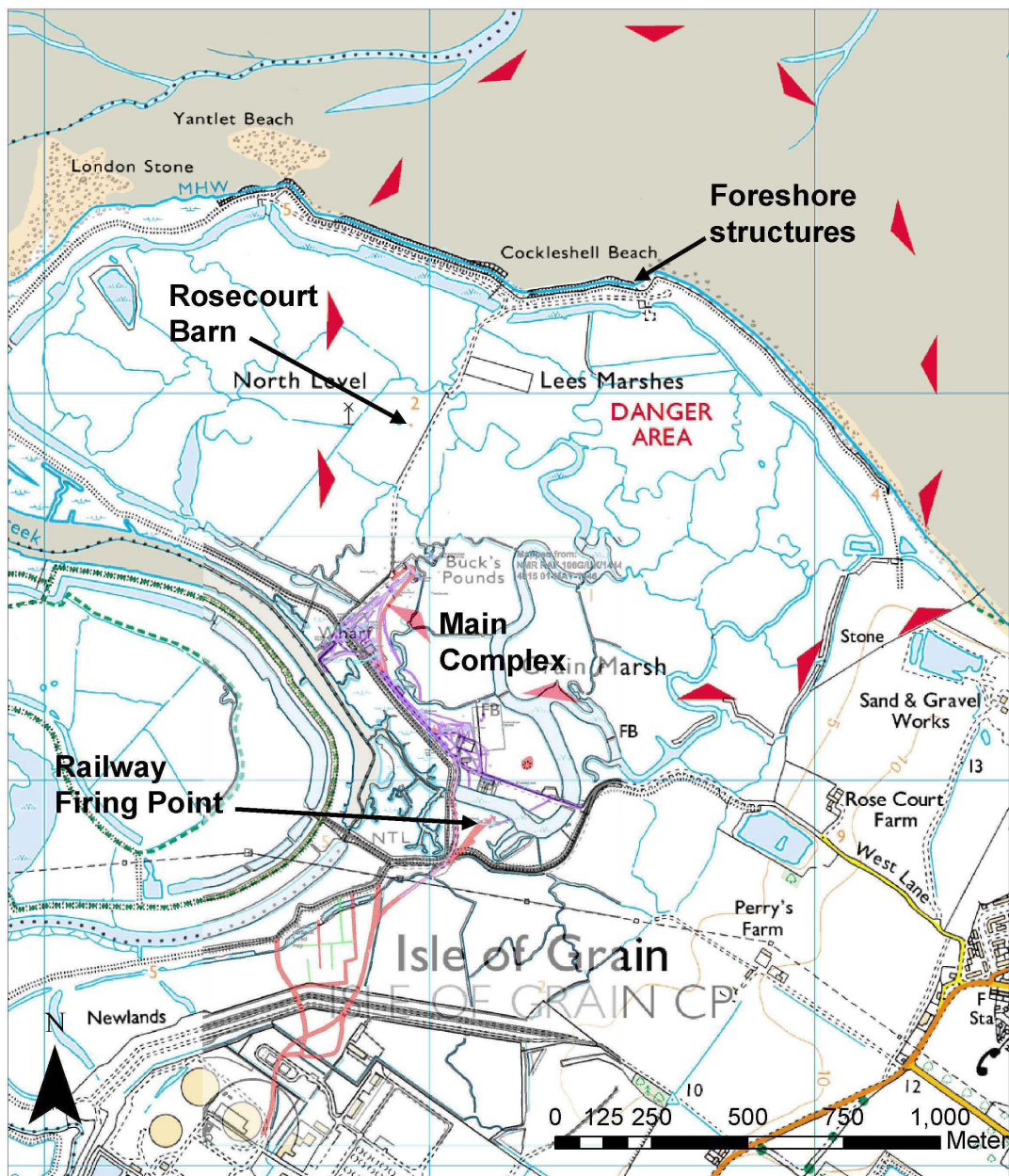


Figure 51. Map of outlying structures.



Figure 52 Concrete base on Coddeshell Beach, looking out over mudflats of the Thames estuary towards Southend.

Foreshore structures

Several structures and concrete bases (Figure 52) are located alongside and close to Coddeshell Beach, just over a kilometre away from the gun emplacement. These include a breeze block structure (NGR TQ 87570 78202) on the landward side of the seabank and some concrete bases on the seaward side at the edge of the beach (NGR TQ 87606 78304). Further research is needed to establish the functions of all of these. Two light emplacements (pointing across the estuary towards Maplin Sands) and an associated engine room are shown on plans of the 1920s, positioned on the line of fire from the firing point. Foreshore structures and installations were linked to the main complex by the road, which steers well clear (on the western side) of the main line of fire.

Rosecourt Barn

(NGR 86933 77936)

The remains of a large compound and/or barn (Figures 53 and 54) survive in a field to the west of the road and to the north off the main firing point complex. The remains of a pillbox (HER 1426741) are recorded here, though not immediately apparent. Concrete sides of low walls, partially collapsed, form an almost square enclosure measuring roughly 21m x 20m. Next to the structure on the west side is a large hollow with adjacent bank. All these are set within a series of larger rectangular enclosures which are almost certainly post-medieval saltern ponds, similar to those shown on the 1798 map in Figures 16 and 17. The structure is partly built of mass concrete, which suggests a military design and function. However, a complex of three buildings is shown on the 1839 tithe map, so clearly some structures here predated the military installations to the south.



Figure 53. Rosecourt Barn, low concrete walls of rectangular compound, with adjacent hollow and bank, from the east.



Figure 54. Rosecourt Barn from the east.

It is likely to have started out, in different form and materials perhaps, as a salt production or agricultural building associated with Rosecourt Farm to the south-east, then later taken over and rebuilt by the military using more modern materials for use as a magazine or store. The former saltern pond has also been reworked in more recent times, probably for animals to drink from. The site serves as an interesting example of a military structure making use of pre-existing elements of the landscape. More research needs to be done on the function of Rosecourt Barn and its relationship to the rest of the firing point complex.



Figure S5. Overgrown remains of railway firing point structures, looking east.



Figure S6. Ballards for tethering, looking east.

Railway firing points and look out post

(NGR TQ 87144 76893)

Linear earthworks and structures associated with a former railway firing point are located to the south of the main firing point complex on the west side of Hamshill Fleet (Balfour 1981). A small line branched off from the main Yantlet line and split into several short sidings up to 140m long. These were oriented south-west to north-east, suggesting that guns were fired in a north-east direction (parallel to the main firing range further north). Some of the railway embankments survive as linear earthworks. There are also linear concrete structures which may be a gantry path running alongside the former railway sidings (Figure 55), and the remains of a small look-out post at the termination of one of them. No detailed description is attempted because the remains were largely hidden by vegetation and no proper examination was possible.

The longest siding has a rectangular setting of four concrete bollards for tethering at its north-western end (Figure 56). The rectangle thus formed measures about 16m x 15m. Each bollard is round in horizontal section, about 1m high with a concrete cap, and set into a substantial concrete base at least 2m in width. The base has additional concrete arms extending outwards in four directions at ground level for added stability and strength.

It is not certain whether armoured trains (Balfour 1981) came to Yantlet, and little is known generally about the use of the railway firing point.

Infrastructure and networks

Road

The main stretch of the metalled road known as 'Peat Way' was built between 1917 and 1923 as a key part of the infrastructure necessary for the smooth running of the firing point complex. It brought traffic and materials from the village of Grain and ultimately from much further afield, though heavy items came by rail or water rather than road.

Peat Way runs parallel to the main buildings and perpendicular to the gantry path. The 1923 map shows it terminating just to the south-east of the gantry path, though it was subsequently extended to cross it and run from north of the velocity screens right up to the light emplacements close next to Cockleshell Beach just over one kilometre away, keeping well clear and to the west of the main line of fire for most of its length.

Internal railway

The railway firing points have already been described, but the railway was also an important aspect of the infrastructure of the main firing point complex, linking the various elements together into a functioning whole, as well as connecting up with wider networks. The line joined up with the main South Eastern and Chatham Railway, Hundred of Hoo branch line, built in 1865. The Yantlet line was added when the firing

complex was built. It branched off northwards from the main line east of the Middle Stoke Halt just before the Grain Crossing Halt, then entered the site via a causeway over Hamshill Fleet (sometimes described as a bridge). There was a small side line which branched eastwards to the look out post and series of three railway firing points (see above). The main line joined the road and ran alongside its north-eastern side it for a distance of about 300m. It then split up into two. The western branch split into two again so that one line curved westwards to the wharf, while the other proceeded more directly to the shell store next to the gun emplacement. The eastern line also split into two, with one short line going directly to the workshop, and one longer line curving eastward to the velocity screen masts.

Some of the metal rails remain embedded in concrete bases. In other cases small embankments constructed across the marshy ground survive as standing earthworks, even though the rails have been removed. The railway is sometimes said to have gone out of use during the mid- 1930s, but in fact was still used in the 1940s.

The line was worked by an internal combustion locomotive (Gray 1974, 64). Apart from the travelling crane for heavy materials, this was the principal means of moving materials around the different parts of the site. If the locomotive was pointed southwards with wagons to the north, it could have taken materials from any one major part of the site to any other simply by heading south to a point alongside the powerhouse, then reversing back up whichever line was appropriate.



Figure 57. Floodbank, looking south-east, from top of bank level with gantry path.



Figure 5B. Floodbank, looking northwest, from top of bank level with gantry path.

Flood bank

The gantry path is effectively bisected by the large flood bank, giving the superficial impression that there are two separate structures either side of the bank, whereas of course the travelling crane it supported functioned as a single structure. Although at first sight it seems as though the flood bank is later in date, overlying the gantry path, the stratigraphic sequence is slightly more complex than that. In fact only that part of the bank which crosses the gantry path is later. The linear bases for the gantry path went through a gap in the bank, with gates for closing the gap in the bank at times of flood. These would have been open at most times when the gantry path and firing point were being used. However, since the travelling crane could pass over the gate, its rails going either side of it, the complex of structures could in principle still be used even at times of flood when the gates were closed.

The wider system of flood banks is older than the firing point complex but parts of it were rebuilt and realigned along the side of Peat Way at the time the firing point was constructed. The infilling of the gantry path watergate gap was the latest phase in a long sequence of floodbank rebuilding, reinforcing and realignment which goes back centuries. In protecting structures from flood at all but the highest tides, these substantial earthworks form an important part of the complex.

Demolition range

Since the 1950s the scope and function of the firing range at Yantlet Creek has changed. Firing of heavy artillery shells gradually ceased, and the site took on the more limited role of a demolition range. There seems to have been a natural progression from one to the other, as the area most used for controlled explosions was precisely that which was on the original line of fire, to the north-east of the main firing point complex. In the Shoeburyness Military Archive there is a plan of the proposed demolition range dated July, 1961. The part of Lees Marsh at the centre of the Danger Area shown on maps in Figures 25 and 51 is pockmarked with traces of small to medium-sized craters resulting from this activity – now showing up as visible hollows in the ground or as 'cropmarks' on aerial photos. Archaeological remains within this zone are likely to have been severely damaged. It is important to note that the buildings of the firing point complex itself are situated outside of the Danger Area.

Recent agricultural structures

The site is now part of a working farm (called Yantlet Farm) and there are some agricultural buildings and sheds interspersed with older structures of the firing point complex. The main one of these is a large shelter next to the road near the centre of the complex, between the powerhouse and workshop complex (Figure 59).



Figure 59. Recently constructed agricultural shelter, framing the powerhouse, taken from the north-west.

INTERPRETATION AND ANALYSIS

The aim of this chapter is to examine aspects of the site in more interpretive and analytical detail, using the rich resource of plans, architectural drawings and documentary evidence (showing the site as it was, rather than as it is now) to illuminate key aspects.

Orientation of the firing point complex



Figure 60. Range and lines of fire across the Thames estuary and along the Maplin Sands, from 1924 War Office plan (TNA WO 78/5129/1), © The National Archives.

Layout of the buildings and structures of the firing point at Yantlet was far from arbitrary, and in fact derived principally from the topography of the south-east Essex coastline. As already noted, the reason for choosing Yantlet as the location in the first place was to facilitate firing of heavy artillery shells across the estuary and along Maplin Sands, giving a total length of range of over 27 km or 17 miles. The south-west to north-east line of the wharf, gantry path, gun emplacement and velocity screens was a small-scale material manifestation of the much longer line of fire known as the Grain Range Line (Figure 60).

The fact that the line of fire thus determined was almost exactly perpendicular to the pre-existing line of the flood bank immediately to the south-west and the adjacent stretch of Yantlet Creek was fortuitous. It led to an L-shaped layout being adopted for the complex as a whole. Half the structures were lined up with the distant Essex coastline; the other half were oriented along the line of the creek and associated local features. It was these two principal axes that were integrated together into the 'L' design. An important point to note in Figure 60, however, is that the Grain Range Line was effectively a corridor. Lines of fire are taken from two locations: the main gun emplacement and the railway firing point.

The firing point complex at Yantlet can be regarded as a discrete site in its own right, adapted to local conditions, but that that would be to miss out on those aspects which are configured in relation the wider topography. In an important sense it is more than just a discrete site. As part of a larger entity – the range as a whole – it extends over a considerable area of the English coastline.

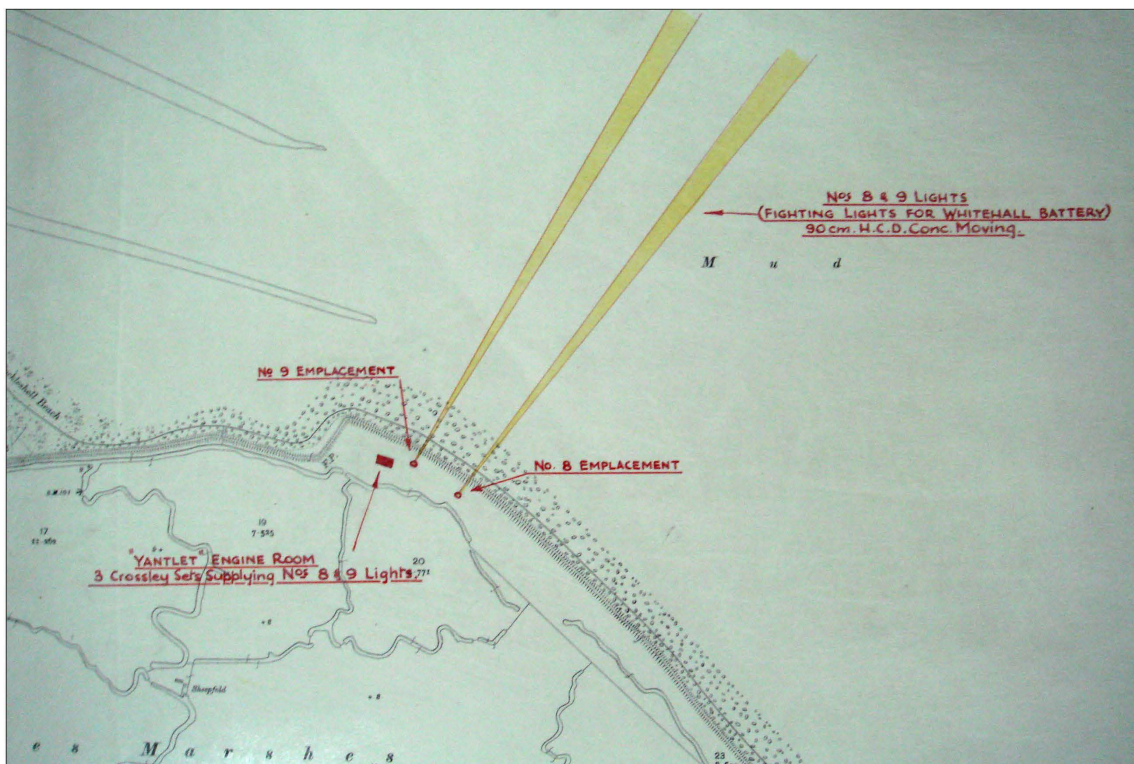


Figure 61. Position of 'Fighting Lights' near the beach, located on and pointing out over estuary along line of fire, 1924 plan (TNA WO 78/5129/3), © The National Archives.

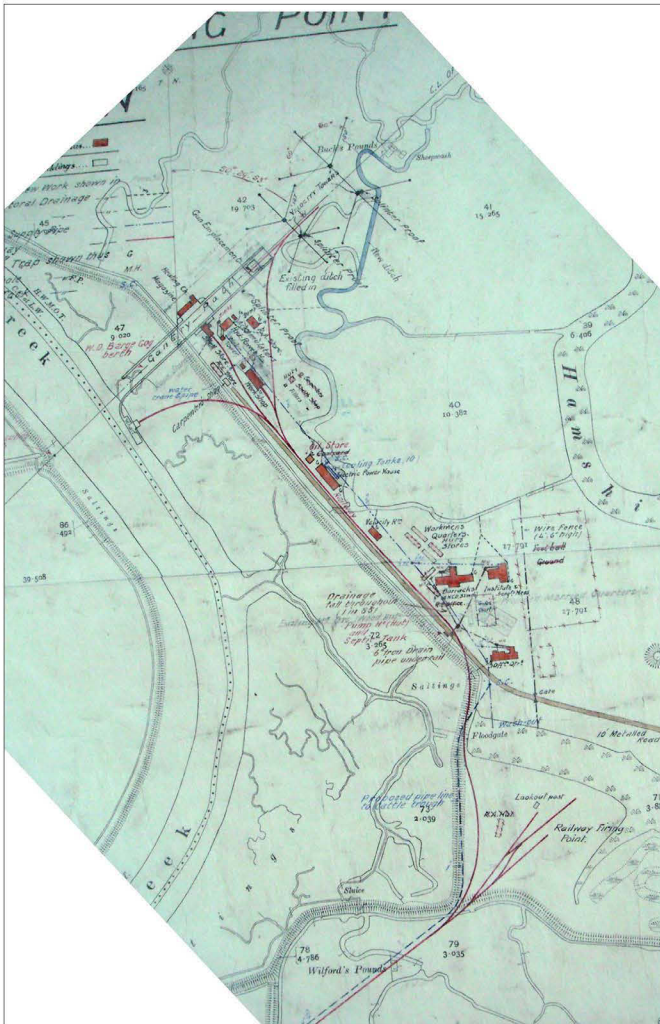


Figure 62. Plan of firing point complex, with railway lines marked in red, 1924 (TNA WO 78/5129/2), © The National Archives.

The significance of some of the buildings and structures of the complex as well as outlying installations can be understood more easily in relation to the overall orientation of the site along its two principal axes. The fighting lights close to the beach, for example, are located exactly on the south-west to north-east axis which defines the main line of fire, and point out across the estuary along that line, affording visibility for night firing (Figure 61). Railway firing points (and the rail tracks leading up to them) take the same south-west to north-east alignment as the wharf, gun emplacement and gantry path (Figure 62), running parallel to those structures at a distance of 0.7km away, and forming a second subsidiary line of fire. In view of what has been said about the principal line of fire, an interesting avenue of research would be to investigate whether additional structures such as velocity screen masts were associated with this secondary, parallel, line of fire.

The process of velocity testing

One of the functions of the firing point was measurement of the velocity of artillery shells fired from the gun emplacement. Velocity screen masts are shown in Figures 63 and 64. Concrete bases and anchor points for the velocity screen masts still survive, though a former 'velocity room' building where the measurement would have taken place is no longer there. The best way of explaining the process is through the words of those who actually took part in it. The following account is from a gunner in the Essex Yeomanry who worked at Shoeburyness in the late 1930s. He is probably referring to the smaller firing point and velocity screens at Shoeburyness rather than the larger ones at Yantlet and it is likely that more sophisticated equipment for measuring velocity of shells was in use at Yantlet. Even so, the description gives a useful insight into methods employed:

Before the War I had worked as a technical assistant at the artillery testing ranges at Shoeburyness, and the future 25 pounder was one

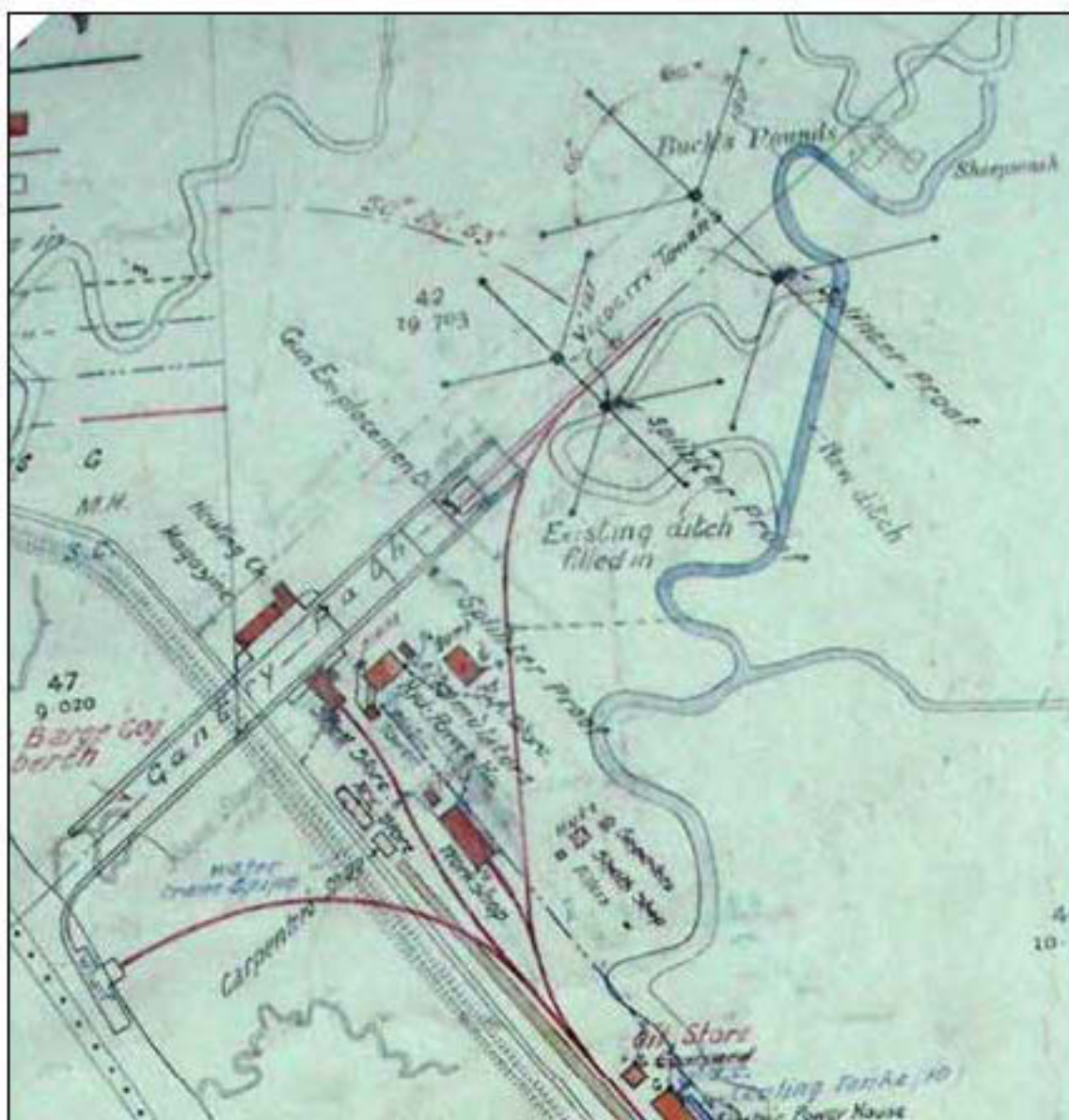


Figure 63. Detail of 1924 plan (TNA WO 78/5129/2), showing main gun emplacement, gantry path, wharf, dock, velocity screens and associated buildings, © The National Archives.

of the many guns that were put through their paces. Part of my job was to operate the apparatus to calculate the velocity of shells...One method was to fire the shell through two fine wire screens a fixed distance apart. The first screen was connected to an electro-magnet holding up a long vertical rod, and when the shell broke the screen the rod fell. In doing so, it passed by a sprung knife blade that was triggered off by the second screen being broken. By measuring the length of rod to the knife cut the shell velocity could be calculated. Later on more sophisticated methods were developed using interrupted light beams and automatic timing to determine shell velocities.

KW (Pitch) Payne, Essex Yeomanry Association Journal (2004).

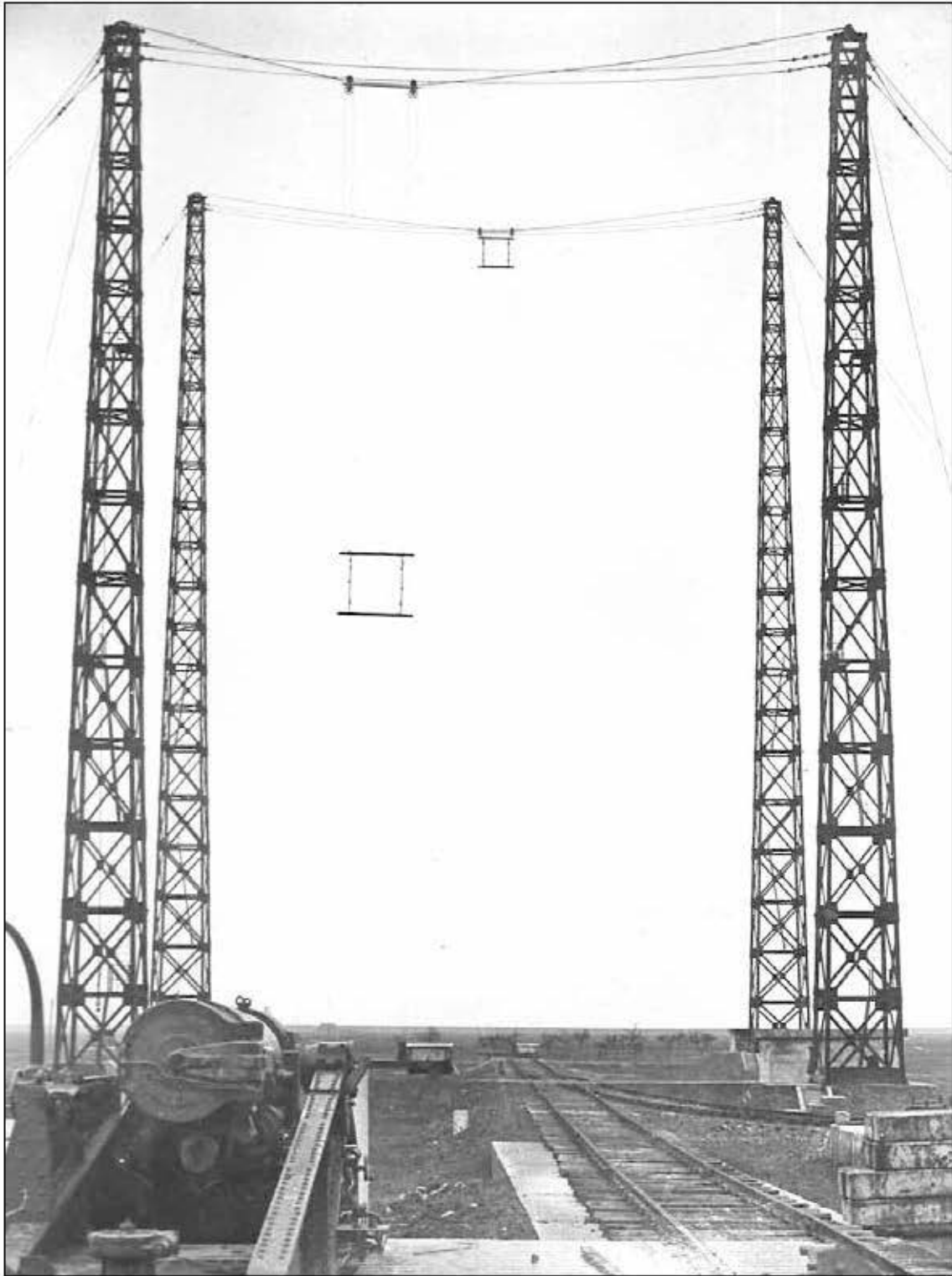


Figure 64. Photo taken in 1923 from the gun emplacement, looking along the line of fire, with small gun to be tested in the foreground. The barrel of the gun is about to be raised and fired through the velocity screens. The exact position of the velocity screens was calculated beforehand according to planned angle of fire. Screens were moved into position along a network of wires suspended from the velocity screen masts. Note the standard gauge railway running along the southeastern side of the gantry path, © The Shoeburyness Military Archives.



Figure 65. Firing point staff on wooden platform next to gun emplacement near end of gantry path, with gun barrel in background. 1933-8, © The Shoeburyness Military Archives.

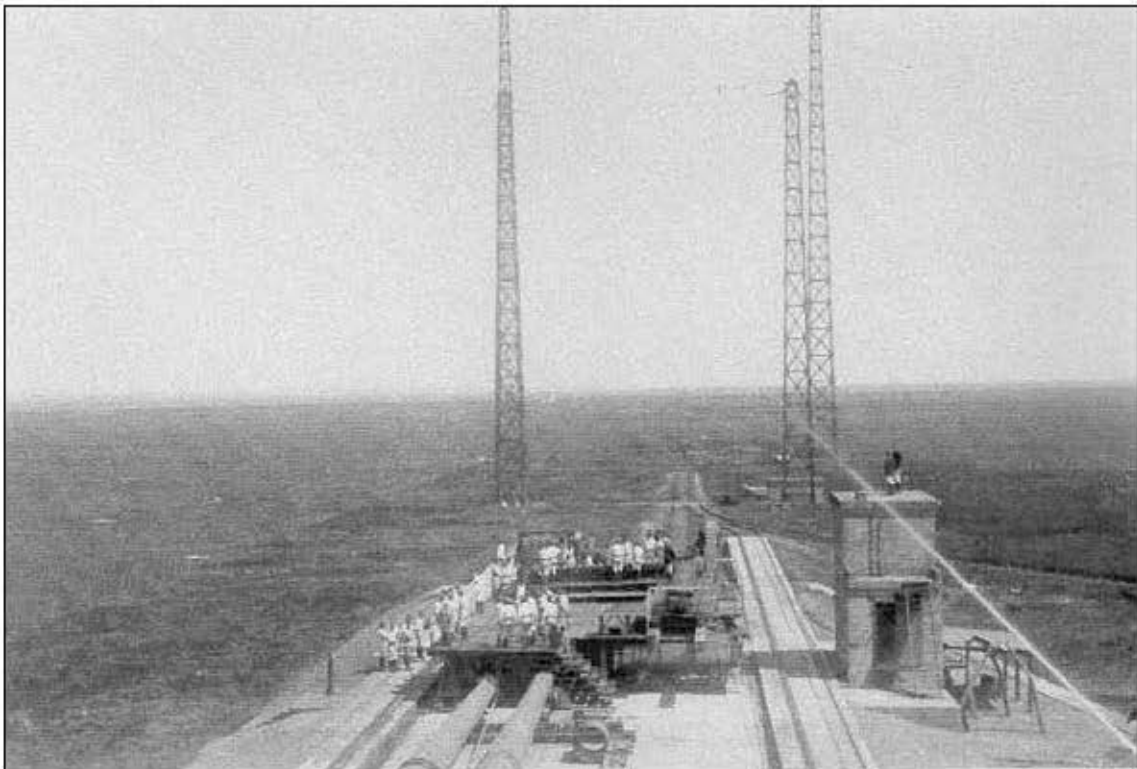


Figure 66. View along line of fire, looking towards northeast, 1933-8, © The Shoeburyness Military Archives.



Figure 67. Loading of gun with weighted (non-explosive) shells during a 'Rapid' (fire) trial of a naval 12in breach-loading gun, looking north, 1933-38, © The Shoeburyness Military Archives.



Figure 68. Broader view of 'Rapid' (fire) trial, looking north-north-east. Note small observation tower on the right. 1933-8, © The Shoeburyness Military Archives.

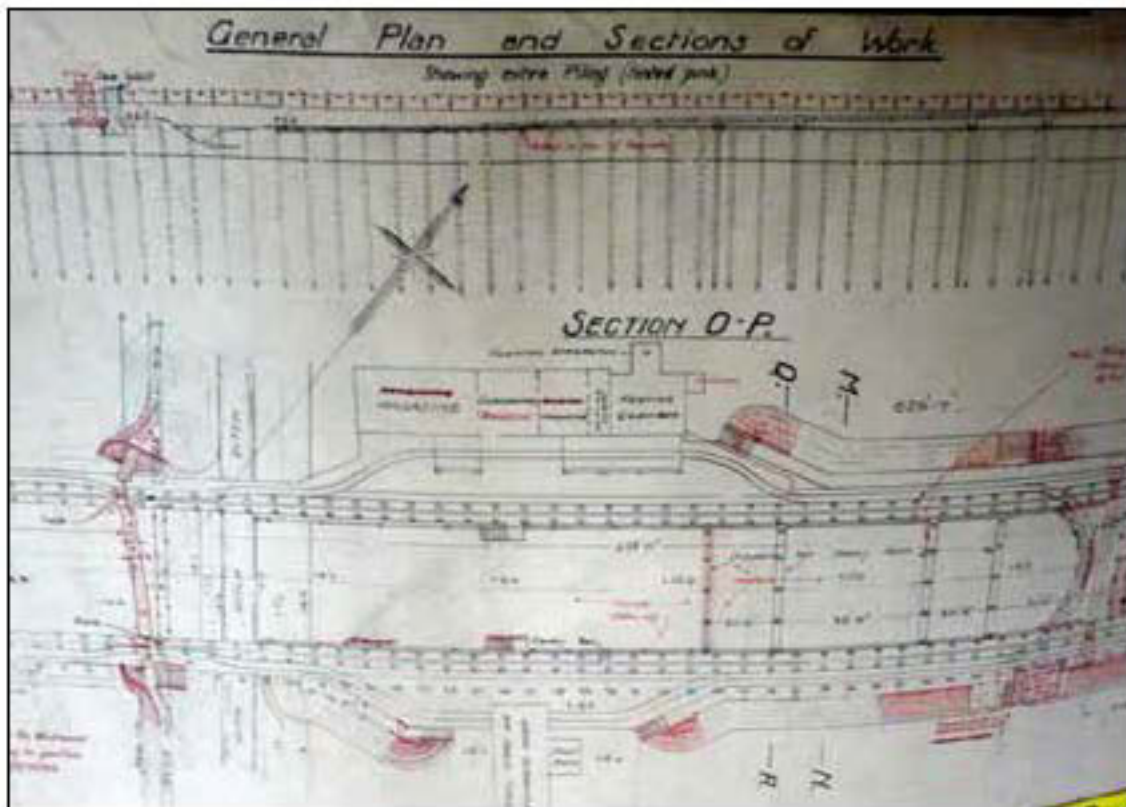


Figure 69. Detail of 1920 drawing (TNA WO 78/4370), showing the central part of the gantry path, gantry rail, magazine store (now demolished) and other structures, ©The National Archives.

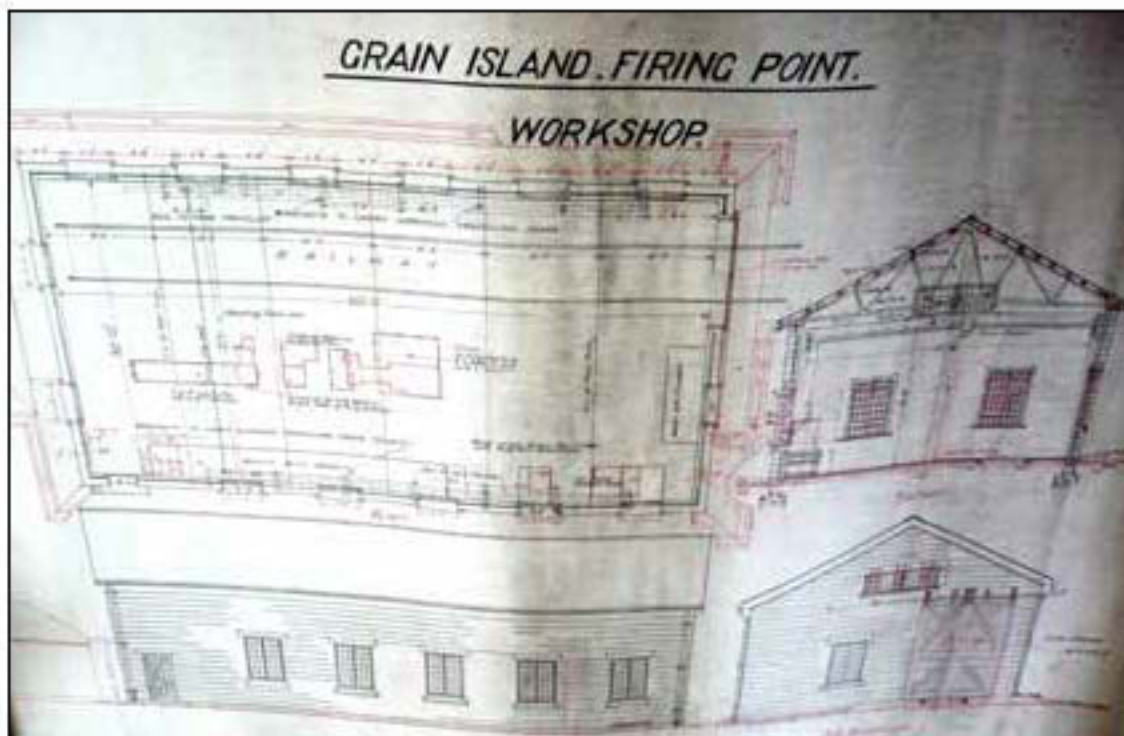


Figure 70 Detail of 1920 drawing (TNA WO 78/4370), showing the main workshop building in plan and elevation, © The National Archives.

Details of structures and layouts

Figures 69-72 are shown as examples of the level of detail on drawings of 1920 (with post-construction corrections added in 1923) held in The National Archives. In Figure 69, for instance, there is useful information on multiple aspects such as the now demolished magazine store and heating chamber, the gantry path floodgate now covered over by the floodbank, the heavy gun supports which were located within the gantry path, the extensive piling which was necessary on the marshy ground to provide a secure footing for the parallel linear concrete bases of the gantry and so on. In Figure 70, it is not just the architectural detail of the main workshop building itself that is depicted, but also the internal fittings and equipment. These include the railway track which enters through the door and runs the length of the inside of the building, the arrangement for an overhead travelling crane for lifting heavy items off and on to railway wagons, the positions of drilling and shaping machines in the centre of the workshop space, etc.

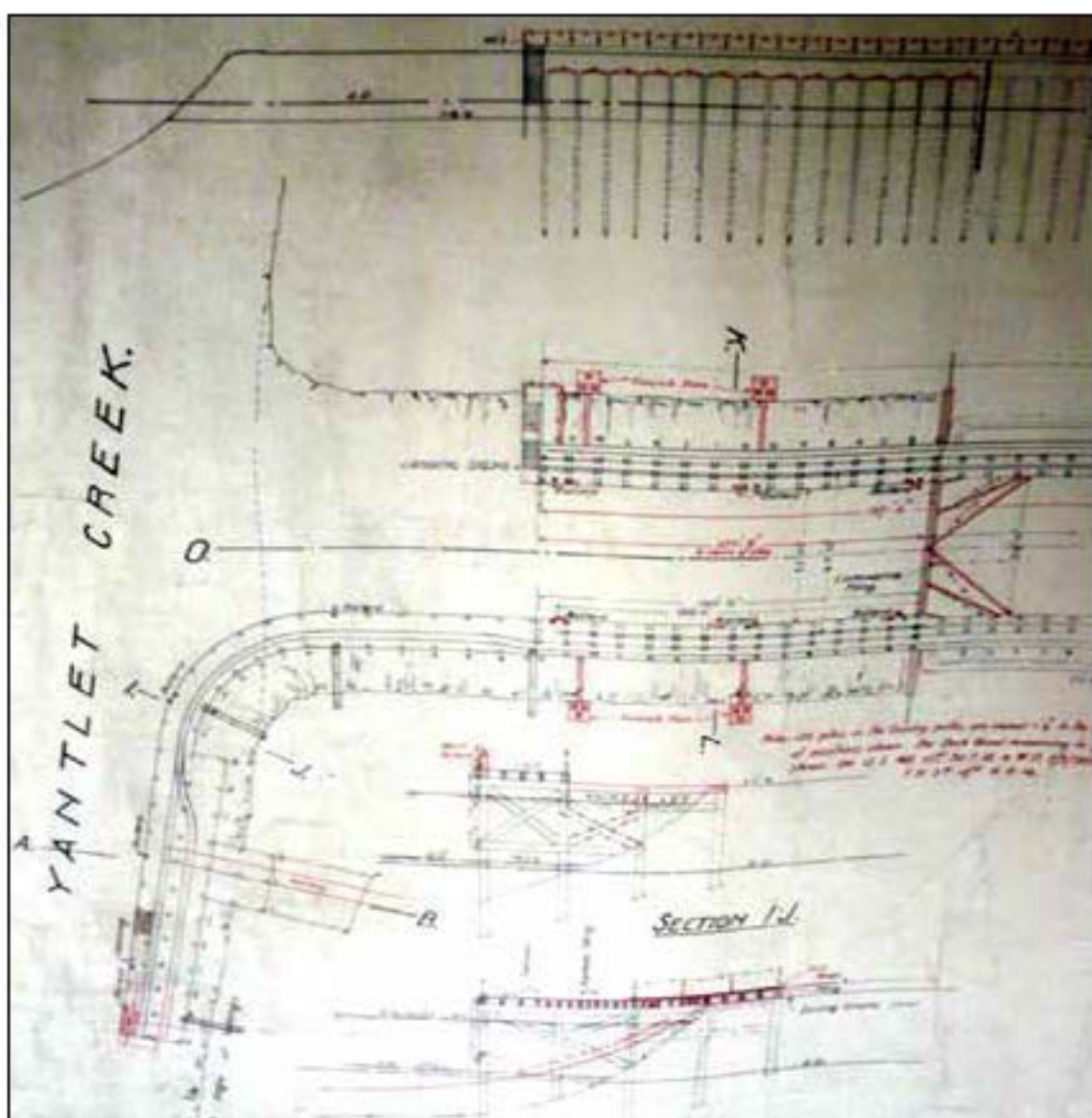


Figure 71 Detail of 1920 drawing (TNA WO 784370), showing constructional information on the dock and timber wharf, © The National Archives.

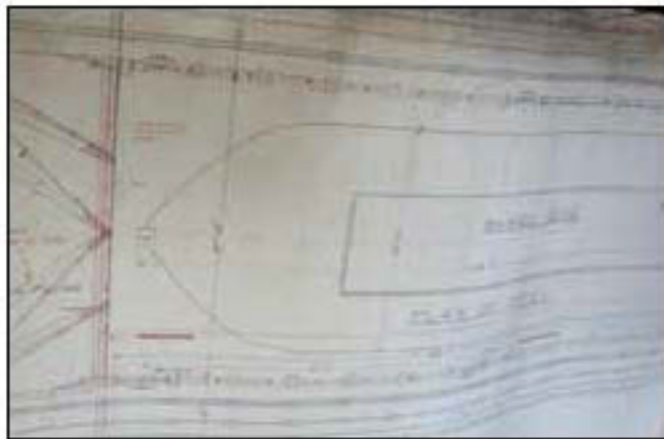


Figure 72. Detail of 1920s drawing (TNA WO 784370), showing the dock in relation to the barge Gog, which it was designed to accommodate. Gog carried heavy guns between Yantlet and Woolwich Royal Arsenal, towed by the steamship Katherine II. Note that this plan is upside-down compared to the previous figure. © The National Archives.

Figures 71 and 72 depict the arrangements for loading and unloading vessels reaching the firing complex via the River Thames and Yantlet Creek. These drawings reveal that the dock was built specifically to serve as a berth for the barge Gog (for photos of which see Habesch 2001). The Shoeburyness Military Archive records installation of a 200 ton lift travelling gantry called 'Nelson' built by Cowan and Sheldon in 1919, removed in 1948. It allowed heavy guns to be taken straight from barge to firing position, or vice-versa, in a single moving operation. The dock had a railway running alongside it, and even the barge itself had a standard gauge railway fitted on its deck. The kind of detail shown in the drawings of the dock and gantry path is provided for all the buildings and associated structures of the firing point complex that were built in the early 1920s - an incredibly useful resource for anyone wishing to investigate the site further.

Information about the types of guns installed at and fired from Yantlet may be available in archives not accessed by the writer of this report. Ian Hogg describes how the gun 5170, with an 8 inch 90 calibre inner tube 18.3m long (made by Vickers-Armstrong) was fitted onto a 13.5 inch Mk5 gun body (made by the Great Western Railway Workshops) in 1942. The gun was nicknamed 'Bruce' after Admiral Sir Bruce Fraser, Controller of the Navy. Its range proved too large even for Yantlet. Moved to Dover in 1943, it was shown to have a maximum range of 96,659 yards, fired at 42° 52' quadrant elevation, with a flight time of 146 seconds (Hogg 1998, 63).

Accommodation and office areas

Much of the southern part of the site was occupied by buildings which served as living quarters. In the 1924 plan, there are six temporary-looking 'workers' quarters' huts and stores (probably removed during the later 1920s). More substantial buildings include the Officers' Quarters and the Institute and Sergeants' Mess arranged around a central tennis court, with a football pitch nearby in the field to the south (Figure 73). All of these original buildings have since been demolished (though plans survive of some of them in The National Archives). The single-storey mess building that is still inhabited today was built as barracks and NCO accommodation over the old tennis court in the mid 1930s, in the centre of the complex of earlier buildings. The police cottages and the guardhouse were also built about that time, reflecting changes in the use of the site and types of personnel. The slight modifications to site layout indicate a time-depth to the development of the firing point complex, which evolved to a limited extent through time.

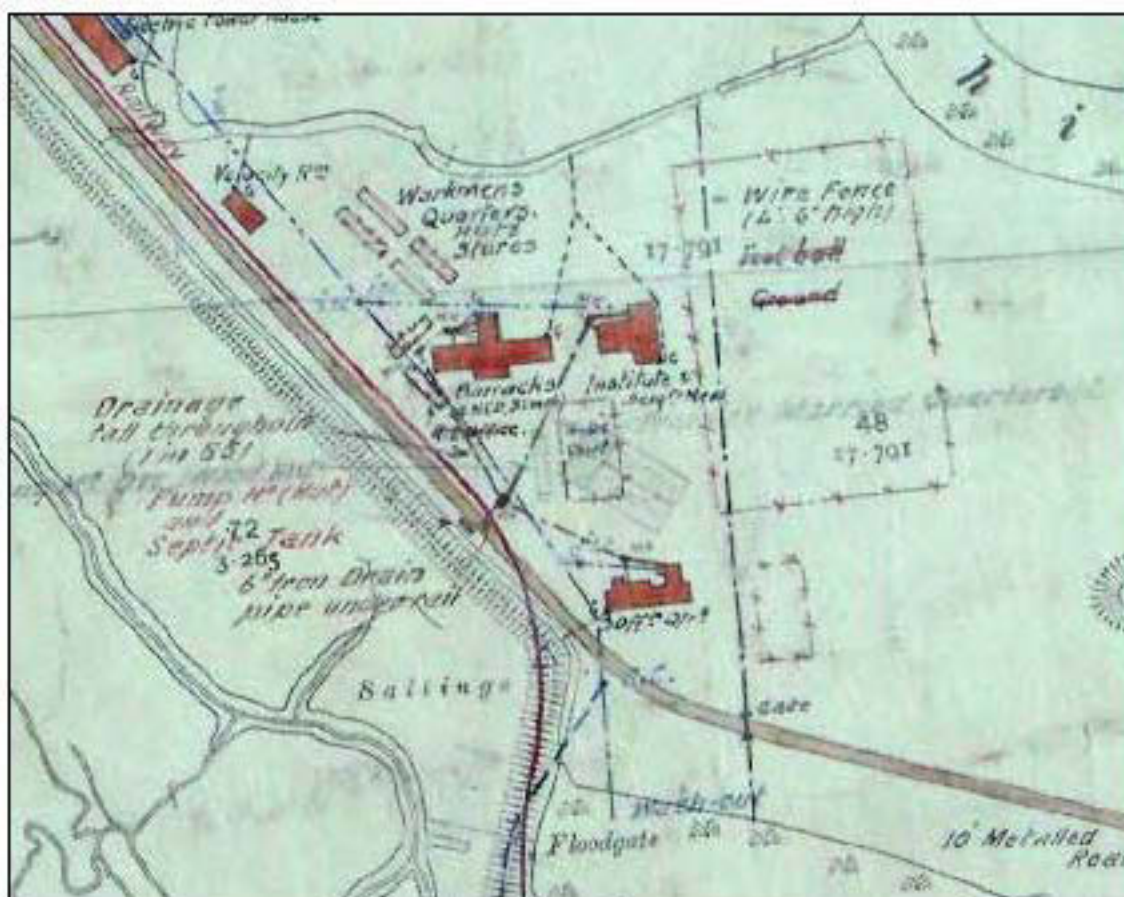


Figure 73. Detail of 1924 drawing (TNA WO 78/5129/2), showing accommodation and office buildings in the southern part of the site, © The National Archives.

The railway firing point

Although the focus of any investigation of the firing point complex might tend to be on the structures associated with the main gun emplacement, it is important to keep sight of the railway firing point as a subsidiary focus. Figure 74 and 75 show the railway firing point to have had its own small travelling gantry, a fact not necessarily be guessed at from the overgrown remains on the ground. An important question is whether, like the main firing point, it had velocity screens and other associated structures. The railway is often said to have gone out of use by about 1935, but there are records of working locomotives there in the mid-1940s. Any associated velocity screen masts would have been taken down before the first known aerial photo of the site was taken in 1946. However that may be, it is likely that in the original design of the complex and first decade of use, the railway firing point was as important in its own way as the main gun emplacement, as indicated by the fact that the Velocity Room was located exactly half way between the two. Referring back to the lines of fire shown in Figure 60, it can be seen on close examination of the map that two firing points are depicted, and that the 'Grain Range Line' is more like a corridor than a line of fire. Consideration of both firing points operating at the same time sheds a slightly different light on how the complex as a whole might be conceptualised, making it somewhat larger than initially thought, and giving the spatial arrangement of structures a greater degree of symmetry and balance.

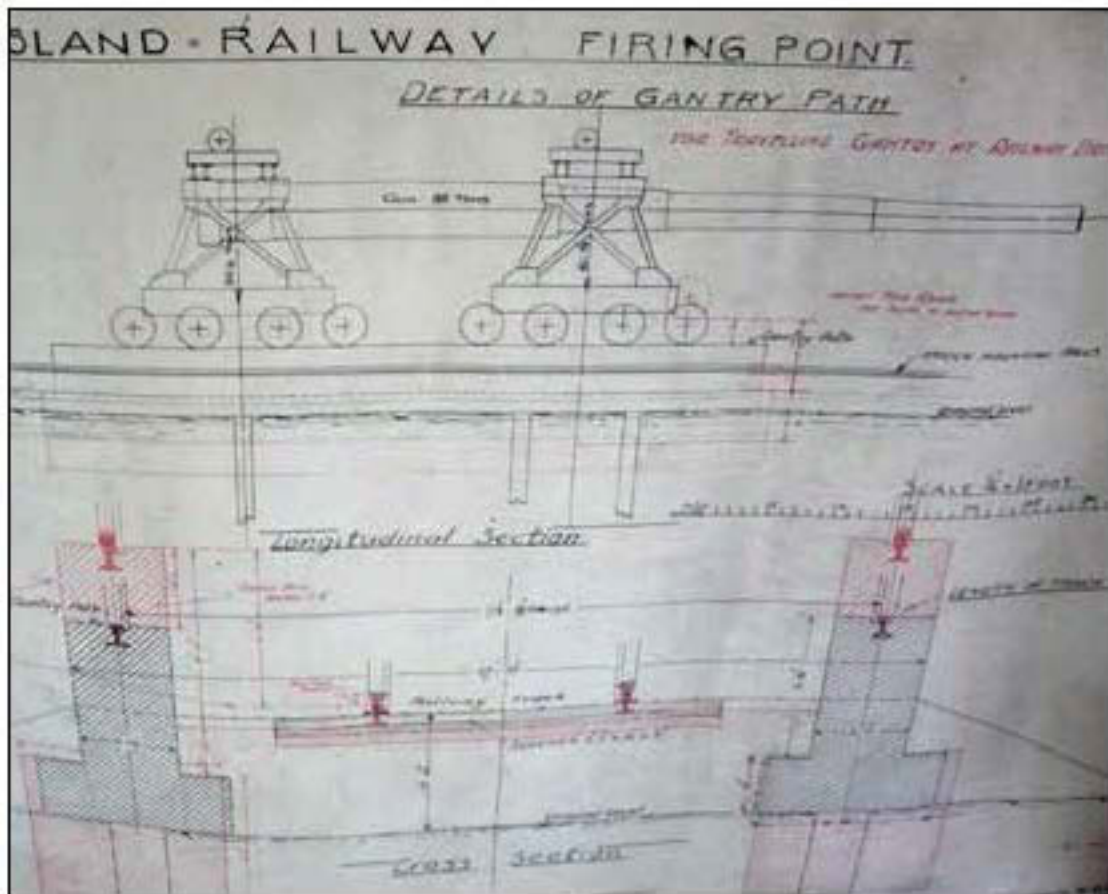


Figure 74. Detail of 1920s drawing (TNA WO 78/4370), showing travelling gantry for railway firing point, © The National Archives.



Figure 75. Detail of 1920s plan (TNA WO 78/4370) showing the railway firing point, © The National Archives.

Naval gun trials

Many of the guns tested at the main firing point were naval guns, destined for RN warships. For example, trials of the 16in gun for HMS Nelson and HMS Rodney commenced in the mid 1920s. Some of these firings were at a range of 36,000 yards. A unique aspect of Yantlet was that, as well as guns being fired from the gun emplacement on land, firings could also take place from the warships themselves. The ships would be positioned on the Grain Line in the Thames Estuary just offshore, firing along the same trajectory onto the range sands along the southeast Essex coast. In the mid-1920s HMS Hood and HMS Tiger made use of this facility. In the mid-1930s HMS Rodney and HMS Nelson fired along the Grain Line. According to anecdote, on one occasion when turret salvos were fired from a ship in about 1930, an officer from Shoeburyness had to ride out at a canter after each salvo to identify each and every crater, logging its position before riding back. After 19 salvos had been fired, the horse was exhausted and the officer severely blistered (information from The Shoeburyness Military Archive).

Noise

The Shoeburyness Military Archive contains many accounts of the sound of firing point operations, as experienced by people living nearby, taken from local newspapers and reminiscences. Noise seems to have become the topic of considerable complaint in 1925, when reader's letters started to appear in the Southend Standard newspaper. There

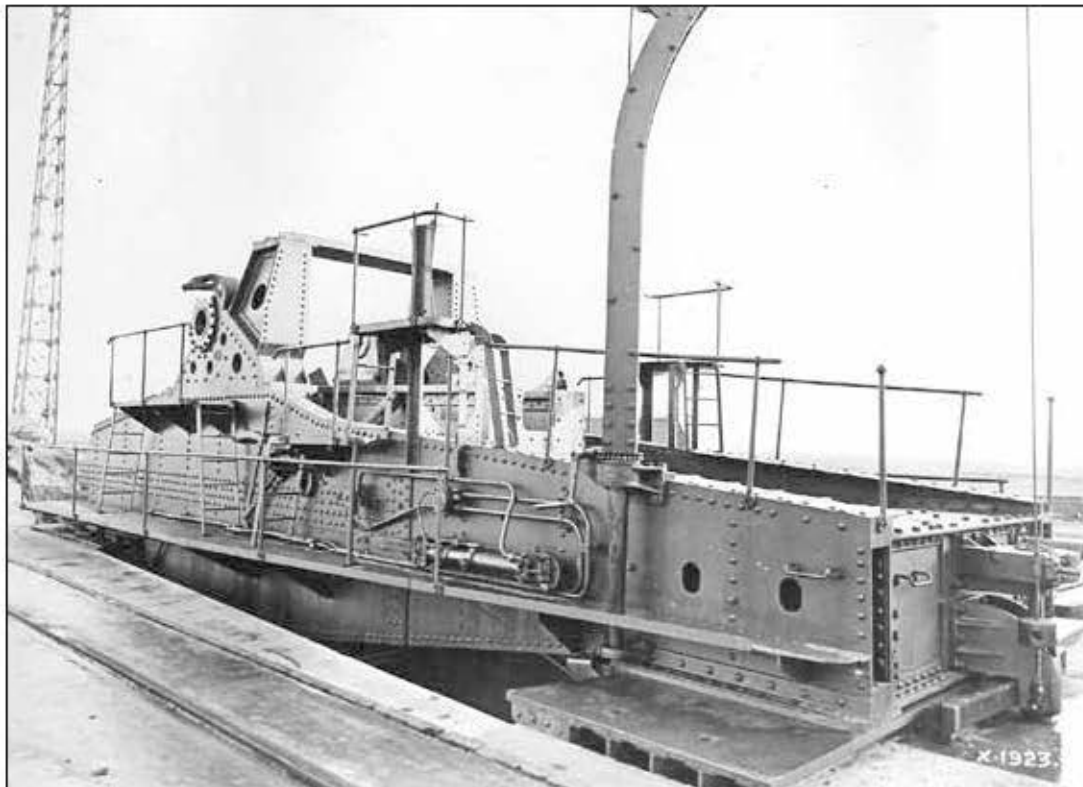


Figure 76. Photo of 'B' Type Coast Defence Mounting nicknamed 'Gargantua', ready to receive gun for firing. It was taken in 1923 from the northwestern side of the gantry path, looking east. © The Shoeburyness Military Archives

were stories of windows and glass vessels being cracked, with damage to ceilings and cement work due to the 'crash and awful vibrations'. Householders were warned to keep windows open at certain times. The sheer noise of it set off other noises, such as dogs barking and windows rattling. Part of the problem was the rhythm of it, with salvos sometimes coming at regular intervals yet with key individual firings missing, setting up a tension as to when the next bang would occur. On 2nd July 1925 an editorial of the Southend Standard stated:

On the previous Tuesday evening the Borough was again subjected to a heavy bombardment from the direction of the Isle of Grain. Within the space of a few minutes, an appalling vibration swept through the district. What of those suffering heart trouble, shell shock, etc?

In 1925-26 Major Tucker from the War Office carried out an investigation into the problem of noise for local residents. His report is lodged in The National Archives (TNA AVIA 7/2990). Some steps were taken to warn residents of impending noise by publicising firing times and using sirens to indicate that firing was about to take place. Of the 85 firing days between January and May, 1928, over 50 were cancelled due to 'bad acoustic conditions'. In December 1926 a Southend resident wrote:

I cannot find words severe enough to denounce the unwarranted desecrations of our Winter Sabbath on the 28th ult. All through the hours of Divine Service the big guns' exercise was disturbing the devotions

Complaints continued sporadically right up to 1928, with letters set to local MPs as well as newspapers. It was said that hotels were rapidly becoming empty and houses were being put up for sale as the direct result of noise from firings. The argument did not all go in one direction, however. Residents at Shoeburyness, many of whom worked at the Experimental Establishment there, did not complain. There was some talk of Southend inhabitants being selfish and not considering the national interest.

On March 29th 1929 the subject was raised in the House of Commons. In response to complaints, the Financial Secretary to the War Office expressed sympathy for residents and said that an alternative site was being sought. The fact was that there was no alternative to the Grain Line, and the number of big guns that still needed testing ensured its continuance as the principal long range firing point in the country.

Some of the shells seemed to have passed the sound barrier and caused shock waves similar to those produced by planes. It was often the case that weighted shells (not live ammunition) were fired over ships passing through the Thames estuary. Attempts were made to measure the noise that was produced. One anecdote by a worker at the firing point described the equipment thus:

At Grain we has a very fragile piece of instrumentation used by the Ballistic Section known as the 'Harp'...It was carried as though it was the Ark of the Covenant. Having arrived, its guardian had a wonderful capacity for dropping it - all back to the launch and return to Shoebury. There didn't appear to be a spare instrument.

(from Shoeburyness Military Archive)

DISCUSSION AND CONCLUSIONS

This report has focused on a basic description of what survives of the firing point complex, with some limited analysis and interpretation. Results of research are provisional and descriptions far from comprehensive. There are almost certainly more records and archived material to be consulted regarding the construction and use of the firing point. Despite its name, which tends to suggest a mere point on the map, Grain Island Firing Point is a large and multi-faceted site. There is great potential and scope for further fieldwork and research.

The landscape at Yantlet is low-lying and wet, characterised by winding creeks, salt marshes and flood banks. Although wild in appearance, it masks a rich medieval and post-medieval archaeology beneath the more obvious military structures and layouts. Noteworthy features of the pre-firing point landscape at Yantlet are:

1) The main Yantlet Creek watercourse, a tidal channel which from at least medieval times provided a sheltered navigation route for ships going to and from the City of London. Far from being a wholly natural watercourse, the creek has been subjected to much modification in the past. It once linked the Thames and Medway estuaries, but was blocked by the construction of a road causeway, leading to silting up along much of its length. The former courses of the creek represent a potentially very rich archaeological resource.

2) The industrial landscape of salt production, which flourished in the 17th and 18th centuries. Several saltern mounds from the medieval period are prevalent in the vicinity of Yantlet Creek, but the later development was of a different order of scale entirely, with grids of ponds extending over huge areas, making use of solar, wind and tidal power. In addition to the site shown on Hasted's map of 1798, which lies just to the south-west of the firing point complex, there was another site to the north on the location of Rosecourt Barn, where some of the shallow ponds and banks survive as earthworks. A windmill and complex of buildings for the production and storage of salt probably once existed heretoo. Such sites deserve detailed survey and further investigation.

The main focus of this report has been on the 20th-century use of part of the landscape as a firing point, sometimes called a Trials Battery, or Experimental Establishment. Its purpose was to carry out trials of all aspects of artillery firing: these included propellant charges, gun mountings, gun barrel pressures, shell flights and velocities, and so on. This kind of military installation has not come to the attention of archaeologists before, and there are few comparable studies. The site itself has often been misinterpreted from aerial photographs, with the velocity screen masts incorrectly but understandably seen as radio masts. One of the most difficult tasks has been to put boundaries onto the site. It has become clear during the writing of the report that the firing point is not actually a discrete site as such. It derives its layout and form as much from the topography of the coastline of south-east Essex, on the other side of the estuary, as it does from the local landscape features. In an important sense it is just one end of the firing line known as the Grain Range Line. Taking into account the firing range as a whole, as opposed to just the points from which guns were fired, it is over 27 km long, and other parts of the same site

could be taken to include the area of impact of shells along the Maplin Sands. The firing point was also, crucially, fully integrated into transportation networks such as railway lines and shipping routes.

Operational links between Grain Island Firing Point and Shoeburyness were strong, to the extent that the former could be regarded as an out-station of the latter. There would have been a small permanent staff living at the firing point, but on firing days staff from Shoeburyness would come over to Yantlet, probably by boat across the estuary, rather than the long way round by rail or road. Shoeburyness staff were also involved in observing the flights and impacts of shells on the observation ranges on Maplin Sands, as well as being involved in other activities such as shell retrieval, measurement of noise, and so on. Operations were initiated and co-ordinated from Shoeburyness.

A more holistic study would look at the two operation centres working together, as a single Experimental Establishment rather than two separate ones. Firing point and associated ranges where impacts occurred should in an important sense both be regarded as parts of the same larger entity. The fact that in this case the two are separated by the mouth of the River Thames is just part of what makes the firing point on Yantlet Creek (and the ranges along the Maplin Sands) unique.

A very rough timeline of the lifespan of the firing point is:

1917	Land requisitioned by the Admiralty
1918	Construction of firing point commenced by the War Office
1919	First rounds fired over estuary along 'Grange Range Line'
1920s-1940s	Main period of use of firing point
1950s	Last firings. Dismantling of some structures
1960s to present	Portions of site used as demolition range

A much more detailed timeline could be worked out, detailing phases of use and types of guns tested, but that lies beyond the scope of this report.

A brief discussion of comparable sites is provided in Appendix 2. The main difference between Grain Island Firing Point and other coastal firing points, such as the one at Eskmeals in Cumbria, was that guns at those establishments were usually pointed straight out to sea, whereas here the firing line was specifically oriented along mudflats next to the coast, giving the option of firing into soft sands or shallow water for Over Water Retrieval (OWR). Shells were generally fired into water and then retrieved when the tide was out, with the implication that firings were closely tied in to times of tides. The Grain Range Line was a unique facility in this respect, at least in the United Kingdom. It was also unusual in that weighted shells rather than live ammunition were used. The coastal alignment afforded additional advantages in terms of the safeguarding of shipping, recovery of shells, as well as facilitating easier observation and recording of shell flights.

When first built, the firing point complex at Yantlet was perhaps also unique in terms of the sheer size and power of the guns being tested, and the corresponding size and complexity of its layouts and structures, with domestic quarters for a small permanent

staff included. It was built as a response and solution to the problem of testing guns that were too heavy and powerful for existing firing points to cope with. In that sense it would fit into an evolutionary typology of firing points, getting larger and more complex through time. There were few other comparable sites to Yantlet in terms of sheer scale of operation at that time, though continuing improvements in artillery design (brought about partly through the gun trials at Yantlet) meant that by the end of the Second World War the shells fired were regularly going past the observed ranges at Shoeburyness. Before being superseded by firing points capable of firing guns over even longer distances, however, Yantlet was overtaken by the shift in technology from guns to guided missiles. It was this shift, it could be argued, that led to the decline in importance of Yantlet and its transformation into a mere demolition range.

More work needs to be done on other firing point sites, in order to assess the significance of this one at Yantlet. Examples include Gantry Battery at the parent establishment of Shoeburyness in Essex, Pendine in Carmarthenshire, the Vickers proofing range at Eskmeals in Cumbria, the Second World War anti-tank gun range at Kirkcubright in Scotland, the earlier range at Porton Down, and other experimental establishments at Aberporth, Beckhampton, Bexhill, etc, listed by Hills (1999, 14). A brief summary is provided in Appendix 2, but the sheer variety of sites in form and function makes the category of Proof and Experimental Establishments, as a type of monument, a fairly loosely defined one. The only experimental establishment site to have been written up in any detail is the one at Inchterf in Scotland (McLanachan 1974). Although very different, it nevertheless provides a useful comparison.

Although about two-thirds of the buildings shown on 1924 and 1933 maps have been demolished (see Appendix 1 for an inventory of buildings extant in 1933), the basic form of the site in terms of its essential infrastructure can still be observed through surviving structures. Thus the masts for the velocity screens may have been taken down, but the concrete bases and anchor points still exist. The travelling crane has been dismantled, but the gantry path and rail along which it travelled are still there. The barge Gog which delivered heavy gunnery to the firing point from Woolwich Arsenal no longer exists, but its berth in the form of the dock is still structurally sound though silted up. The firing point, though no longer in use, has left a very legible mark on the landscape.

The survival of elements of wharf, dock, gantry path, gun emplacement, internal railway network, railway firing point, powerhouse, workshop, velocity screens, along with associated buildings and structures - formerly all linked in with each other and fully integrated with external networks - makes Yantlet quite exceptional as an example of a Trials Battery and the firing point part of an inter-war experimental establishment. There is a wealth of documentary evidence in the form of original plans in The National Archives, showing the form of structures in great detail. The value of these is much enhanced by the fact that material evidence for most of them still exists on the ground as well as on plan, so that the two forms of evidence can be correlated. There are as yet no other published examples of firing points with similar levels of on-ground survival and background documentation, and there is more investigative work of this nature to be carried out in the near future.

Built into the design of the firing point complex was a combination of two different types of firing points, one of which was designed for railway-mounted guns. Although described in parts of the report as an outlying installation, the railway firing point was an integral feature of the overall layout of the complex as originally conceived, though it is perhaps unlikely that the two firing points would have been used at the same time due to excessive logistics. It has also been pointed out in the report that guns were also on occasions fired and tested from warships anchored just offshore from Yantlet and positioned exactly on the Grain Range Line. In this sense the gantry path and gun emplacement at the firing point can be regarded as a precise marker of one end of a line of fire, which could be utilised for firing along even from other points along that line.

A useful approach for a future study would be to try to gain more understanding of the processes which took place at the site, perhaps in terms of work flow analysis. Physical movements of guns, mountings, ammunition, people, materials, information, communications and so on from one part of site to another, and from one process to another, were clearly extremely well organized, and this organization finds some expression in the layouts and structures that still survive. There is much to be learnt from closer examination of the material remains on the ground, as well as from study of documentary evidence.

In one sense the status of the firing point at Yantlet was no different from that of any other battery of the Shoeburyness XP at time of use, and may not have been perceived as special then, but it is of particular interest today in for the long range firing that took place there, and the size of guns being tested. But the interest goes beyond the fields of military history and the technological development of weaponry. The spectacular sight of shells being fired, the sound of firing and other controlled explosions, the distinctive smell associated with heavy guns, and so on, was part of the lives of people on Hoo, and (at least with regard to noise) those living on the south-east coast of Essex, for much of the period between the First World War and the 1950s. The firing point is deeply embedded in the recent history of the Isle of Grain.

ABBREVIATIONS AND TECHNICAL TERMS USED IN THE TEXT

Abbreviations

AMIE – Archive Monument Information England
AOD – Above Ordnance Datum (sea-level)
AONB – Area of Outstanding Natural Beauty
AP– Aerial Photograph
BGS – British Geological Survey
CKS - Centre for Kentish Studies
EH – English Heritage
HER – Historic Environment Record
LIDAR – Light Detection and Ranging (a remote optical sensing technology)
NGR – National Grid Reference
OD – Ordnance Datum (sea-level)
OS – Ordnance Survey
P&EE - Proof and Experimental Establishment
R&A - Range and Accuracy trials
SAM – Scheduled Ancient Monument
TNA - The National Archives
XP - Experimental Establishment

Glossary

Creek – a channel or stream running through a salt marsh.

Fleet – a creek or inlet

Gantry path – foundation for the mounting of a travelling crane.

Magazine – ammunition storage building.

Saltern – mound, usually with central hollow, associated with the practice of salt-processing.

Saltmarsh – sheltered mud and grassland along shores of estuary and creek

Salt-pan – tank or reservoir for evaporating seawater to extract salt, or site where such tanks were once used.

Sleeching – process where brine was extracted, concentrated and evaporated from salt-rich sand and sediments.

Velocity screens – wire screens of fine wire positioned perpendicular to line of fire to measure the velocity of artillery shells, as part of the testing of guns.

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TNA WO 78/5129/2 War Office plan, 1924, detailed map of firing point complex.

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APPENDIX I. LIST OF BUILDINGS AND FACILITIES, 1933

1. Velocity Towers.
2. Splinter Proof.
3. Gun Emplacements/Mountings,
4. Concrete Platforms/Aprons.
5. Observation Post.
6. Store and Office.
7. Hydraulic Accumulators.
8. Officers Splinter Proof (post 1933).
9. Hydraulic Power House.
10. 3,000 gall Settling Tank.
11. Plant Room and Cooling Chamber.
12. Heating Chamber.
13. Magazines.
14. Pit for Gun Parts.
15. 10,000 gall Tank.
16. Shell Store.
17. Rope Store.
18. Lean-to Sbed.
19. Coalyard No. 1.
20. Coalyard No. 2.
21. Overhead 200 ton Gantry Crane (approx 200yds travel).
22. Barge Dock.
23. Landing Stage.
24. Examiners Building.
25. R.A. Store.
26. Worksbop.
27. Forge.
28. Railway Engine Shed.
29. Oil Store.
30. Store and Office.

31. Engine Room.
32. Accumulator Room.
33. Six Cooling Tanks.
34. Water Tank.
35. Store.
36. Velocity Room.
37. Paint Store.
38. Office.
39. Carpenters Shop.
40. Stores and Office.
41. Stores.
42. Two Barrack Rooms and four NCOs Rooms plus Toilets and Ablutions.
43. Sergeants Mess and Regimental Institute.
44. Two 'B' Type Married Quarters (single storey).
45. Two 'B' Type Married Quarters (two storey).
46. Officers Quarters and Mess (for three Officers).
47. Four Quarters (two each 'D' and 'E' Type) for WD Constabulary (1937/38).

(from list made in 1933, with accompanying sketch map, in The Shoeburyness Military Archive)

APPENDIX 2. PROOF AND EXPERIMENTAL ESTABLISHMENTS

Ranges for the proofing of artillery guns originally came under the control of the Master General of the Ordnance, chairman of the Board of Ordnance - which served the needs of both the Army and Royal Navy. In 1855, the Board of Ordnance was absorbed into the War Office, which was responsible for setting up and administering Experimental (XP) Establishments like the one at Shoeburyness in Essex and Eskmeals in Cumbria.

Up until the 1840s, Plumstead Marshes in Woolwich provided the principal location for practice firing and artillery testing. However, the dangers resulting from increased boat traffic on the River Thames combined with the greater range of weapons being tested made the acquisition of a new site essential. Land was first purchased at Shoeburyness, Essex, by the Board of Ordnance in 1849, for the setting up of a practice range. It is still in use today. Tony Hill's (1999) book gives an excellent account of operations there.

The firing range at Eskmeals opened in 1897. Firing was carried out over the foreshore with medium to large naval guns produced by Vickers in Barrow and taken to Eskmeals by rail. The site had its own railway sidings and halt off the main Bootle line. A South Battery was added to the Main Battery and new workshops were built as more and bigger naval guns were produced. Field guns were also tested. During the First World War over 15,000 trials and proofs were carried out on guns at the range. The main difference between this (and other coastal ranges) and the one at Grain Island was that firing was for the most part directed straight out to sea, placing no restriction on the number of firing points. Eskmeals had up to fourteen. Grain Island, on the other hand, had only two, if one includes the railway firing point, both of which were constrained to a particular line or corridor of fire. Offsetting this, the firing point at Grain made by the gantry path and gun emplacement was probably more highly developed than any other firing point in the country.

In the inter-war years and throughout the Second World War, as guns got larger and more powerful as well as more diversified, there was an increased demand for artillery testing. The Grain Island Firing Point was founded and flourished in that period, specializing as it did in long range weaponry testing. In 1948 Experimental Establishments (XPs) officially came to be called Proof and Experimental Establishments (P & EEs).

The handlist of 20th-century training and experimental sites in Dobinson (2000, 18) lists the following XPs and P & EEs in England: Beckhampton in Wiltshire, Eskmeals in Cumbria, Melton Mowbray in Leicestershire and Shoeburyness in Essex. Another which ought to be on the list of English sites is Lavington in Wiltshire. To these should be added, if Wales and Scotland are to be considered, Pendine in Carmarthenshire and Inchterf in East Dunbartonshire. Others XPs/P & EEs in the British Empire which might provide useful comparisons are Balasore in India (established in 1894) and Port Wakefield in South Australia (established in 1929).

There are other sites which were called P & EEs, but the name masks enormous variations in scale, form and function, with many different types and sizes of artillery being tested, from rifles to anti-tank-guns to naval guns.

Apart from Shoeburyness, the one experimental establishment to have been written up in any detail is Inchterf near Kirkintilloch 12 miles northeast of Glasgow (McLanachan 1974). This was a Closed Range, as opposed to an Open Range like the one at Grain Island. It opened in 1940 and was operational until the mid 1990s. It tested guns from rifles up to 7.2 in Howitzers. It had two 150 metre long batteries, each with eight firing positions and one smaller 75 metre battery. It also had six reinforced concrete, sand-filled stop butts, a type of feature which of course was absent entirely from the Grain Island firing point. Firing was co-ordinated from a long blast-proof building. A long corridor of z-shaped blast walls linked the various firing positions. There are some points of similarity with Grain. A branch line off carried guns and propellant charges to be tested into the site, linking it to the main railway network. There were also some domestic quarters for permanent staff. But essentially the arrangement of the site was completely different from the firing point considered in this report. It was designed for testing smaller guns, to be fired on a much smaller scale of operation. The emphasis was less on testing the flight of shells and more on the testing of propellant charges. However, the example is useful for illustrating a more usual type of XP/P & EE, against which the uniqueness of the Grain Island Firing Point can be measured. Some Second World War Royal Ordnance factories, such as RAF Swynnerton, Staffordshire, also had proof ranges for proof testing small arms ammunition.

The weapons testing ground at Kummersdorf in Germany provides a very useful comparison to Grain Island Firing Point, particularly as it is the subject of an excellent book (Fleischer 1997). This inland artillery proving ground was opened in 1875 and used for testing weapons throughout the First and Second World Wars and inter-war years. Photos and information in the book can shed light on processes going on at Yantlet, as there was clearly technical knowledge held in common, despite wartime opposition

A shift in technology which had a major impact in the 1950s was the development of guided missiles. Some P & EEs specialised in this technology. The one at Aberporth in Wales had a simulated ship firing platform for the testing of surface-to-air Sea Slug, Sea Wolf and Sea Dart missiles. The evolution of larger and larger guns with ever increasing ranges came to an end, and this is probably one of the main reasons why Grain Island Firing Point closed down and became a demolition range. Inundation during floods of 1953 may have hastened the end of operations.

Those establishments still in use in 1992 became the responsibility of the Directorate General of Test and Evaluation, which merged with the Defence Research Agency to form the Defence Evaluation & Research Agency (DERA) in 1995. Surviving establishments (Eskmeals, Pendine and Shoeburyness) were privatised with the creation of QinetiQ in June 2001.



ENGLISH HERITAGE RESEARCH AND THE HISTORIC ENVIRONMENT

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