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Ramsgate Heritage Action Zone: An Assessment of Aerial Photographs and Lidar

Fiona Small & Martyn Barber

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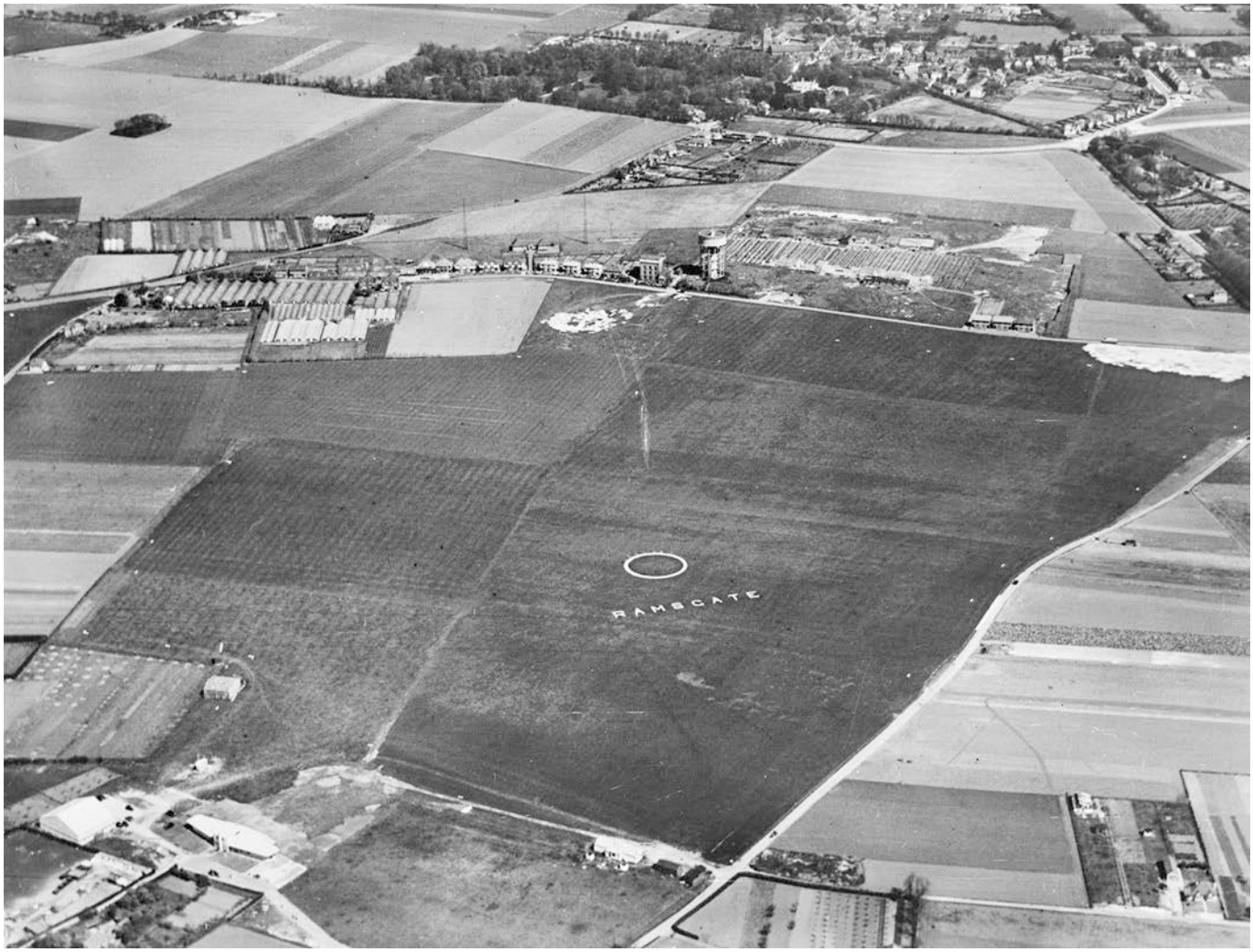

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Ramsgate Heritage Action Zone

An Assessment of Aerial Photographs and Lidar

Fiona Small and Martyn Barber

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SUMMARY
The Ramsgate Heritage Action Zone is a partnership project undertaken to raise awareness of the historic environment in order to inform the delivery of heritage-led regeneration. The aerial investigation and mapping project, summarised in this report, complements other research by Historic England on the historic fabric of the town itself, on the connections between the modern town and the more distant, prehistoric, past of the area, and an assessment by Land Use Consultants of the town's historic character.

Aerial photographs available to the project cover almost a century, documenting changes to Ramsgate and its environs from the 1920s to the present. They also capture traces of much earlier periods, the oldest belonging to the 4th millennium BC. Records of over 330 new sites were created for the 20 sq km project area, including a newly-recognised Early Neolithic causewayed enclosure (the third to be identified in the area); numerous prehistoric burial monuments including a previously unrecognised oval barrow, also potentially Early Neolithic in date; and extensive traces of settlements and associated field boundaries from the later Bronze Age, Iron Age and Roman periods. Highlights from the medieval period include traces of Upper Court and Nether Court Manors, plus some probable fish weirs in Pegwell Bay.

RAF aerial photographs taken during and after the Second World War offer a detailed view of the impact of that conflict on the town. They captured various installations and defensive features, as well as the extent of bomb damage and the subsequent appearance of replacement housing in the form of pre-fabricated buildings. The report also highlights aspects of the relationship between the modern town and the more distant past, particularly in the Nethercourt area where features of Iron Age and Roman date (and potentially earlier) revealed as cropmarks now largely lie beneath the houses and gardens of post-war housing estates.

CONTRIBUTORS
The mapping was undertaken by Fiona Small. The report was written by Fiona Small and by Martyn Barber.

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Luke Griffin of the Historic England Archive managed and delivered the aerial photography loan. Various Historic England colleagues provided invaluable assistance: Geraint Franklin provided an introductory tour of Ramsgate as well as advice on various aspects of Ramsgate's past, notably the post-war pre-fabs; Jonathan Last advised on prehistoric sites on Thanet; Edward Carpenter discussed various sites and issues; and Sharon Soutar provided assistance with illustrations. Steve Crowther and Amanda Dickson (Skylarkeology) discussed Second World War military remains; and Alison Deegan advised on previous surveys.

ARCHIVE LOCATION
The Historic England Archive, The Engine House, Fire Fly Avenue, Swindon SN2 2EH.

DATE OF SURVEY
The survey and mapping were undertaken during the summer of 2018. The report was written during the summer of 2019.

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Cover Image: Oblique Aerofilms view of the civil airfield at Ramsgate in April 1937, a few months before its official opening as Ramsgate Airport. The art deco terminal building can be seen bottom left. HEA TR3767/0017 EPW052882 24-APR-1937 © Historic England Archive (Aerofilms Collection).

CONTENTS

INTRODUCTION

Project Background

The aerial investigation of Ramsgate was initiated in 2017 as part of Historic England's in-house research contribution to the Heritage Action Zone (HAZ) initiative. The HAZ programme seeks to highlight the role that the historic environment can play in urban regeneration, and Ramsgate is one of 20 areas selected as a HAZ since 2017. Research undertaken by Historic England teams, in partnership with local authorities and other local partners, aims to increase understanding and raise awareness of the historic environment within each HAZ and to engage with the local community. More specifically, this research was designed to:

- Provide HAZ partners with baseline information on the history and development of Ramsgate and contemporary issues facing it;
- Inform a programme of work to be undertaken by Historic England's regional Planning and Development teams;
- Promote public awareness of Ramsgate's historic environment in order to achieve a greater appreciation of the town's distinctive character.

As part of the Historic England research contribution, an analysis of aerial photographs held by the Historic England Archive at Swindon, and of Environment Agency airborne laser scanning data (lidar), was undertaken by the Aerial Investigation & Mapping (AI&M) team. This report presents the key findings of that work.

The principal aims of the aerial assessment were to:

- Provide an overview of the archaeological remains in and around the town that are visible on aerial photographs and lidar images;
- Assess their contribution for the understanding of the history of the site of Ramsgate from prehistory to the present day;
- Record key aspects of the development of the town.

Methods, Scope and Sources

The AI&M component of the Ramsgate HAZ involved the analysis of all accessible aerial photographs and lidar for an area of 20 sq km covering the whole of the town and immediate hinterland (Fig 1). The latter included current, and former, open areas around the town. Mainly arable, these offered clear potential for the identification of archaeological remains, whether buried (as cropmarks) or surviving above ground (as earthworks). This analysis resulted in the mapping and recording of archaeological remains and other features of historic interest seen on aerial images. Drawing on other aspects of the overall HAZ project, including an overview of the area's prehistory (Last 2019), the Historic Landscape Characterization (HLC)

(LUC and Archangel Heritage 2018), and a Historic Area Assessment focusing on the historic fabric of the town (Franklin forthcoming), the goal was to use aerial photographs and lidar to produce a brief archaeological narrative for the town and environs, from prehistory to the present, to complement these other reports. Ramsgate is unusual among HAZ projects in receiving this detailed consideration of the more distant as well as the more recent past.

In common with other AI&M projects, all archaeological features visible on aerial photographs and lidar were mapped and recorded to AI&M (formerly NMP – National Mapping programme) standards. This included Second World War military structures. However, in addition to standard AI&M approaches, the project included an assessment of other Second World War-related features such as areas of bomb damage, allotments, and post-war prefab housing within the town. The mapping is available via the Historic England Archive, while the accompanying monument records, comprising descriptions and sources for each site, are available online via the Heritage Gateway.

Figure 1: Ramsgate HAZ project survey area © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Two previous aerial survey projects overlap the project area. Ramsgate's coastal fringe was partly surveyed for the National Mapping Programme (NMP) component of the South East Rapid Coastal Zone Assessment Survey (SERCZAS), which was undertaken by Wessex Archaeology on behalf of English Heritage

(Hamel and Lambert 2011). Their report mentions some of the Second World War sites in the town. The whole area was also included in a pre-NMP pilot project, *The Classification of Cropmarks in Kent* (RCHME 1989) in the late 1980s which covered most of the county. That project was undertaken primarily to provide baseline data for the then-new Kent Sites and Monuments Record (now HER). It was also intended to contribute to the development of a methodology for large-scale aerial survey projects, and to inform approaches to the classification of cropmark sites. It drew on fewer aerial photographic sources than are available now, and was also of more limited scope than current AI&M projects.

All accessible vertical and oblique aerial photographs held by the Historic England Archive in Swindon were assessed. As well as oblique photographs taken by Historic England's (and its predecessor organisations') own aerial photographers, this collection also includes historic and recent images – mainly verticals – derived from a number of sources, including the RAF, the Ordnance Survey, and Aerofilms. These range in date from the 1920s to the present, with more systematic coverage beginning in the 1940s. Online sources (Google Earth, BING, Channel Coastal Observatory) were also consulted. The Cambridge University Collection of Air Photographs (CUCAP) is currently closed. Sites within the project area have previously been recorded from CUCAP photographs, and while some of these CUCAP photos were available, either online or as print copies in the Historic England Archive, in a small number of cases it was not possible to fully reassess previous mapping and interpretation.

A total of 1083 vertical (i.e. those where the camera was pointing straight down at the ground) and 641 oblique images (i.e. those capturing an angled view of the ground) were examined in the course of the project. Where possible, photographs were viewed through a stereoscope and under magnification. Digital images, including both born-digital images and high resolution scans of photographic prints, were viewed on screen. Environment Agency lidar data was processed using the Relief Visualisation Toolbox (RVT: see Kokalj *et al* 2011) to produce multiple visualisations. The survey resulted in the creation of 337 new records and the updating of 48 existing records in Historic England's National Record of the Historic Environment (NRHE) database.

Mapping the Ramsgate HAZ

The AI&M component for the Ramsgate HAZ provided comprehensive archaeological mapping and a record of Ramsgate and its hinterland as seen on aerial sources (Fig 2 – see fold-out plan at back). This provided the basis for an archaeological narrative covering aspects of the history and development of the landscape from prehistory to the present.

The project covered an area of 20 sq km encompassing the whole of the town of Ramsgate. To the west and northwest of the town, the project area extended into the neighbouring parishes of Manston and Cliffs End, thus incorporating parts of Ramsgate's more rural (arable) hinterland. The northern limit of the survey area was drawn approximately where Ramsgate and its immediate neighbour Broadstairs meet.

Key highlights

Traces of a range of sites representing many periods of occupation and cultivation have been recorded from aerial photographs across the area surveyed, most of them mapped from cropmarks. Many sites had been noted or investigated by earlier surveys and excavation, but much of this work had been undertaken at a site level or confined to an area of proposed development. Larger scale area aerial survey enables a more comprehensive and contextual overview of all the remains (earthwork, structures, cropmarks, soilmarks and parchmarks) visible on aerial sources.

The types of site recorded included numerous late Neolithic-Early Bronze Age funerary monuments, mostly remnants of round barrows seen as ring ditches, as well as a few traces of the extensive early medieval burials known to exist to the west of Ramsgate. Settlement remains from the later prehistoric, Roman and medieval periods, including traces of associated field systems, were also recorded. Cropmarks representing the buried remains of one of the several known medieval manors on Thanet could be seen on historic aerial photographs. The site is now lost to view as a result of subsequent development.

A significant number of the buried archaeological sites visible as cropmarks on aerial photographs were recorded and mapped for the first time. Of particular interest is the large number of previously unrecorded ring ditches, which represent the traces of levelled Bronze Age round barrows, and a potential Neolithic causewayed enclosure (Fig 3 and below, pp 14-15). The latter is the third site of this type identified within a 1.5km strip overlooking Pegwell Bay. Equally of note is a possible Neolithic oval barrow visible as the levelled remains of a long chalky mound bounded by a ditch, also within this same strip of land to the west of Ramsgate (below, pp 16-17). Historic aerial photographs taken in 1984 and 1988 have also revealed a large triple-ditched sub-rectangular enclosure, possibly of later prehistoric origin, now under the Westwood Cross Shopping Centre (below, pp 21-22).

Aerial photographs taken mainly by the RAF during and immediately after the Second World War effectively recorded a series of snapshots in time of Ramsgate and its immediate surroundings, as well as capturing key details of particular points of interest (see below, pp 37-55). For example, these photographs revealed the remains of active and passive defences and air raid shelters, as well as evidence of the bomb damage, the latter followed in some instances by erection of post-war emergency prefabricated housing (below, pp 55-60). Although much of the major coastal defences were recorded as part of the South East Rapid Coastal Zone Assessment (SERCZAS), traces of the more subtle and transient anti-invasion structures, such as a grid of posts in Pegwell Bay and others placed in large fields inland to the west of Ramsgate (below, pp 50-52), had not been recorded before the HAZ survey. Seen on RAF aerial photographs taken in 1941 and 1942, most of these structures had been removed by 1946, but traces of the holes that held these posts may still remain and could be encountered during archaeological excavations.

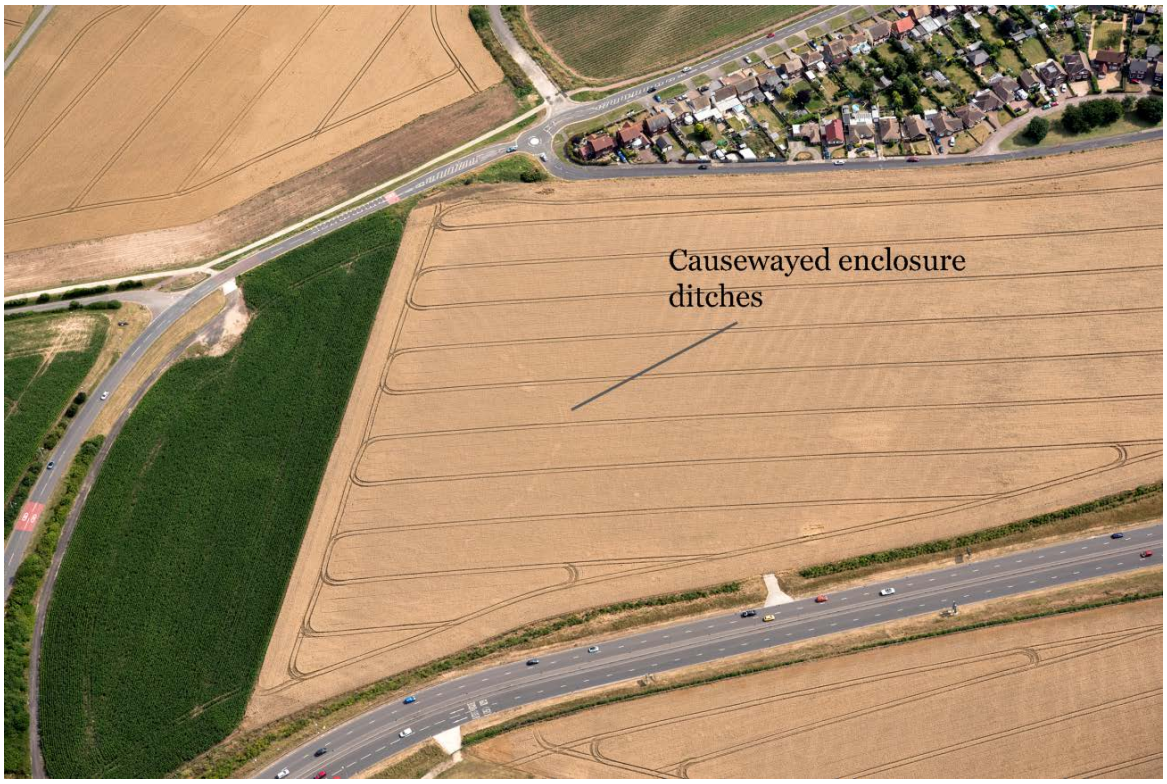


Figure 3: Faint pale cropmarks of an arc of interrupted ditches and pits of a possible Neolithic causewayed enclosure between Cliffs End and Lord of the Manor. North is to the bottom of the photograph. 33362_015 13-JUL-2017 © Historic England.

RAMSGATE: AN OVERVIEW

Historical background

The Isle of Thanet forms the most easterly part of Kent, lying beyond the point where the Thames Estuary opens into the North Sea. It is largely made up of Cretaceous Margate Chalk over Seaford Chalk, with a few surviving outcrops of sedimentary sandy/silty Thanet beds above these. Quaternary deposits of clay and silt have accumulated in the network of fossilised incised watercourses across the island. The chalk forms cliffs on the southern and eastern shores around Ramsgate, the ground generally rising inland to form an East-West ridge at 50m above Ordnance Datum (OD), before sloping gently northwards to the northern coast at Margate (see e.g. http://mapapps.bgs.ac.uk/geologyofbritain/home.html).

Thanet was still effectively an island until relatively recently, separated from mainland Kent by the Wantsum Channel. This has gradually narrowed over the last two millennia through a combination of natural silting and various episodes of drainage and reclamation from at least c AD 1000 onwards (Young 2004). The last ship known to have used the channel did so in 1672, while the northern sea wall was completed in 1808 (ibid.).

The town of Ramsgate is located on Thanet's south-eastern coast. Today it is a seaside town and channel port located at a strategic break in the chalk cliffs. Historically, with safe harbouring and proximity to the continental mainland, the area has been important for both maritime traffic and trade.

The prehistory of the survey area down to the Bronze Age is covered within Last (2019), and Thanet's prehistory in general has been summarised recently by Moody (2008), so there is no need for a detailed appraisal here. However, it is worth emphasizing that while there is abundant evidence for human activity on Thanet during the Mesolithic period, and significant monumental evidence for settlement, agriculture, funerary and ceremonial sites from the Neolithic onwards, there is very little surviving above ground – as earthworks – due mainly to the impact of ploughing and urban development, particularly over more recent centuries. In fact, with few exceptions, such as some of the 20th century military sites, virtually all archaeological features recorded during this survey were mapped as sub-surface features visible through cropmarks recorded on aerial photographs.

Historically this stretch of the Kent coastline is associated with a number of key events, beginning with the landings of Julius Caesar in 55 and 54 BC at Ebbsfleet on Thanet (Fitzpatrick 2018), and the arrival of Claudius' legions from AD 43 at Richborough (Small 2002). In AD 597 St Augustine's mission from Pope Gregory in Rome landed on the Ebbsfleet peninsula (Brooks and Hardington 2010), while Vikings reportedly overwintered on Thanet in AD 851 and 865 (Whitelock 1961, 42)). Far less historically certain are the supposed landings by Hengist and Horsa, allegedly in or near Pegwell Bay, in AD 449.

Evidence for a Claudian presence at Richborough has long been known, but archaeological evidence for Julius Caesar's landings has only been identified much

more recently (Fitzpatrick 2018). There is no shortage of evidence for Roman occupation across Thanet, but so far there is very little indication of a settlement of any considerable size on the island. Thanet's medieval and post-medieval history is better attested, particularly in terms of the role played by the Church. Historically, Ramsgate lay within the parish of Minster-in-Thanet, where a monastic settlement had been established by the late 7th century. By Domesday, Minster was a Manor of St Augustine's Abbey, Canterbury, holding lands across Thanet (Sweetinburgh 2004), including a number of manors such as Pegwell, Ozengell Grange, Manston Court and Newlands Farm in the vicinity of modern Ramsgate (Quested 2001, 22).

The settlement and subsequent port of Ramsgate almost certainly owes its existence to the favourable topography of the area. The town developed from a small fishing settlement located at a point in the southern cliffs of the Isle of Thanet where the valleys of three watercourses converged and drained towards the sea via a broad dry valley, forming a low point with access to the beach. This gave access to the shore, where outcrops of rocks parallel to the beach afforded protection to small ships and boats from the prevailing south-westerly winds.

The Confederation of Cinque Ports, established by the 1150s, comprised five ports which were required to provide ships and crews for the King in return for constitutional, trading and financial privileges. Four were located in Kent – Dover, Sandwich, New Romney and Hythe. A number of smaller ports were classified as 'limbs' of main Cinque Ports, with Ramsgate established as a limb of Sandwich by 1353 (Lawson 2004, 52).

Through the 18th and 19th centuries Ramsgate developed from a fishing village with a safe haven into a prosperous port with connections with the Baltic trading network of the North Sea coast. The old medieval town expanded onto the adjacent cliffs and the harbour was improved. The town itself had gained popularity during the Regency period as a seaside resort, something that resulted in the expansion of the town to accommodate and provide amenities for the increasing numbers of visitors (Moody 2008, 13). The inter-war and post-Second World War periods saw further phases of expansion of the town's housing stock along major roads, as well as the infilling of open spaces between existing housing. The late 20th and early 21st centuries have been marked by further infilling as well as expansion and re-development for new out-of-town retail developments and several major road improvement schemes.

A brief history of archaeological investigation in Thanet

Although some of Thanet's antiquities – both sites and finds – had long attracted interest, the first published study dedicated to the historic remains on Thanet was the work of John Lewis, the vicar of the parish of Minster. His *History and Antiquities, ecclesiastical and civil, of the Isle of Tenet…* (1st ed. 1723; 2nd ed. 1736) was based mainly on a study of historical documents and observations of the landscape (Moody 2008). From Lewis's accounts of the opening of mounds on Thanet, it is clear that a number of the island's prehistoric barrows still survived as earthwork mounds into the early 18th century.

During the mid-19th century, the depth and quality of accounts and investigations in Thanet improved under the influence of Charles Roach-Smith and the British Archaeological Association, and was bolstered by the formation of the Kent Archaeological Society in 1857 (Moody 2008,13-14). In 1845 Thanet was linked to the expanding rail network with a line to Margate. At Ozengell, to the west of Ramsgate, works on a railway cutting destroyed over 200 graves belonging to an extensive and well preserved early medieval cemetery. This was a fraction of the total extent of the cemetery, and is only one of several that have been encountered across Thanet (Moody 2008, 14).

As the pace of expansion of the coastal towns of Thanet increased through the 19th and 20th centuries, there followed a number of key archaeological discoveries and excavations. The 1970s saw the birth of rescue archaeology, the Kent Archaeology Rescue Group (KARU) being formed in 1971 as a full-time professional rescue unit. Meanwhile, 1976 saw the formation of the Isle of Thanet Archaeology Unit, with its first excavation carried out on part of the Lord of the Manor barrow group close to Ozengell Grange (Moody 2008, 23-24).

In recent years, particularly in the late 20th and early 21st century, Thanet has been the scene of a number of large scale archaeological investigations in advance of development, including several large road improvement schemes, the most significant being the Ramsgate Harbour Relief Road and East Kent Access Road 2009-10 (Andrews *et al* 2015). Development-led excavation within urban Ramsgate has yet to have any significant impact on understanding of the more distant past, but some key discoveries, including the Neolithic causewayed enclosure at Court Stairs, are highlighted in this report.

Previous analysis of aerial sources has been limited. The county of Kent was covered by one of the earliest NMP pilot projects (RCHME 1989), the aims and scope of which were very different and far more limited than has subsequently been the case, including a marked emphasis on the classification of cropmarks rather than analysis of sites in their landscape setting. As already noted, Ramsgate's coastal fringe was partly surveyed much more recently for the National Mapping Programme (NMP) component of the South East Rapid Coastal Zone Assessment Survey (RCZAS (Hamel and Lambert 2011). Locally, the Isle of Thanet Archaeological Unit made considerable use of aerial photographs in compiling their own local sites and monuments record during the 1980s (Isle of Thanet Archaeological Unit 1988). Initial compilation preceded publication of the RCHME report, but did draw on photographic resources not used by the RCHME project (e.g. the Potato Marketing Board) as well as photographs taken by the Unit's own staff. Otherwise, appraisal of reports on recent archaeological work in the vicinity suggests that aerial photographs have not been systematically consulted, with the focus of survey being primarily confined to the area affected by planned development.

ARCHAEOLOGICAL DISCOVERIES

Soils and geology

The underlying geology on Thanet is a significant contributory factor to the visibility of cropmarks in and around the town of Ramsgate. There is a clear correlation between (a) the solid geology (the underlying rocks) and drift deposits (surface clays and sediments), and (b) the formation of cropmarks over buried archaeological features. The presence of buried ditches, pits and banks can affect the rate of growth of crops planted in the soil above them. Over time ditches and pits dug into the subsoil would have filled up to provide a greater depth of soil than their surroundings, providing better growing conditions to the crop immediately above. Conversely, the presence of buried walls, foundations and compacted surfaces such as roads can result in shallower soil depth and inhibited growth of plants above such features. When it has been particularly dry for a period of time, the impact of the variation in soil depths becomes more exaggerated and the differences in crop growth can become visible as cropmarks. The patterns created are best appreciated from above. Particularly pertinent to the cropmark distribution in the HAZ project area is the fact that quicker-draining soils – those on gravel or chalk, for instance – are more likely to produce cropmarks than heavy clay soils, which tend to retain a store of moisture for longer (see e.g. https://historicengland.org.uk/research/methods/airborne-remote-sensing/formation-of-cropmarks/).

The distribution of cropmarks

On Thanet, the cropmark remains of buried sites are for the most part confined to areas where the chalk outcrops (Fig 4), but are generally absent over the deep head deposits of clay and silt, and where the Thanet beds outcrop – these are all less conducive to cropmark formation than chalk.

Fig 4 shows the distribution of cropmark sites within the survey area in relation to the underlying geology. In addition to the influence of soils and geology, a major reason for discontinuity in distribution is, of course, the presence of Ramsgate itself, which obscures our view of substantial areas of outcropping chalk where we might expect cropmarks to form in the right circumstances. Known discoveries pre-dating the early 20th century certainly suggest that prehistoric and Roman activity continued across the current urban area – for instance, in the West Cliff area in the 1920s (with one report referring to a discovery of "a cartload of pottery": Taylor & Collingwood 1921, 223-4), and Nethercourt in the 1940s (see below, pp 29-30). However, overall the information is relatively sparse for pre-Roman periods, being mainly limited to records of easily recognizable finds such as stone and bronze axes, Iron Age coins, and burials – the kinds of thing we might expect to attract the attention of antiquarian collectors prior to the later 19th century. Finds and reports of Roman material have been more plentiful across the town, although as with the prehistoric finds, generally very little is known about the circumstances of discovery and context of many items – in fact, in too many cases it is not entirely clear exactly where they were found.

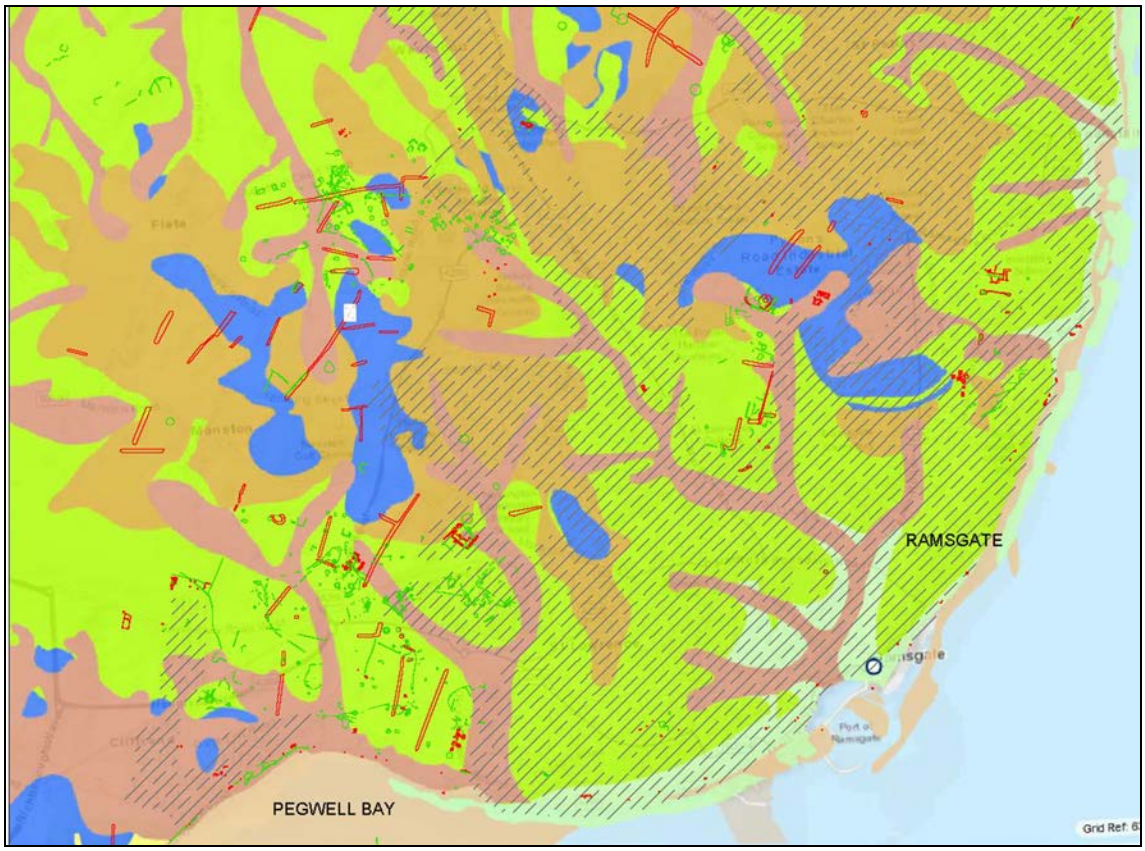


Figure 4: Illustration the relationship of cropmarks on Thanet to the underlying geology and the built-up areas of Ramsgate and surrounding settlement. Cropmarks are mostly dark green. The linear red features are mainly low earthwork banks identified from the lidar data. Chalk outcrops at the surface in the green areas, Thanet beds (Blue), superficial sediments (brown), and Brickearths (orange). Built-up areas are hatched. © Historic England; Contains British Geological Survey materials © UKRI 2019; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

The cropmarks shown in Fig 5 extend east and southeast from the village of Manston to the coast between Cliffs End and Pegwell. Across much of this area, the underlying chalk bedrock outcrops at the surface. The quantity and density of the cropmarks seen in areas such as this within and around Ramsgate gives a clear sense of the extent to which the Isle of Thanet as a whole has been occupied since the Neolithic period onwards. In this area alone are the remains of three Neolithic causewayed enclosures, two confirmed through excavation and a third discovered in the course of this project, a possible Neolithic oval barrow, and at least 50 Bronze Age round barrows. Between Ozengell Grange and Lord of the Manor is the site of an extensive late sixth to seventh century (early medieval) cemetery (Moody 2008, 160), which is largely known from excavated remains, but some of the individual grave cuts can be seen as cropmarks on aerial photographs. There are cropmark traces of settlements and field systems from the late Bronze and Iron Ages, as well as the Roman and early medieval period, a possible Roman villa complex and the sites of at least four medieval manors. The area is also dotted with the cropmarks of numerous pits probably of all periods from the Neolithic to the present day, representing the remains of quarrying, building, storage, ritual, burial and most recently, part of the coastal anti-invasion defences from the Second World War.

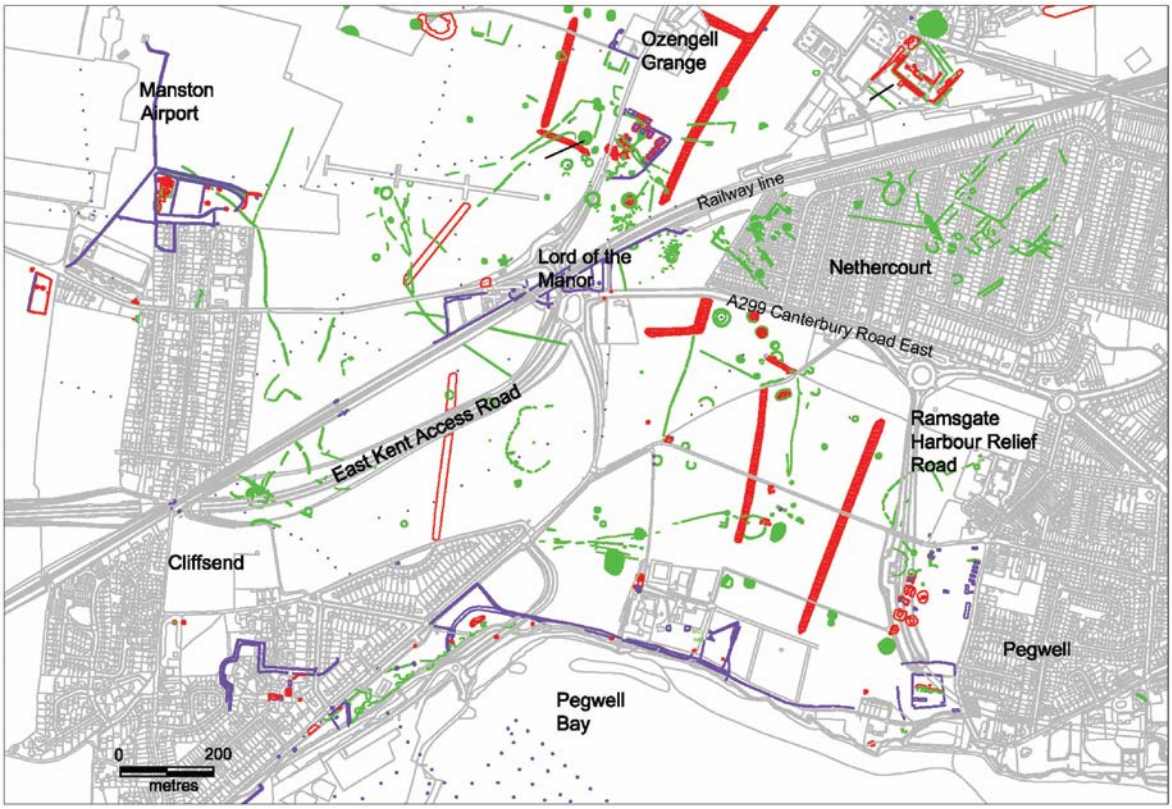


Figure 5: Transcribed archaeological features visible on aerial photographs and lidar images to the west of Ramsgate. Red indicates banks and mounds, green for ditches and pits, and purple for structures, © Historic England. Base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Neolithic causewayed enclosures

Neolithic causewayed enclosures are among the oldest archaeological monument types in the British Isles. They belong to the early centuries of the Neolithic (which began c 4000 BC), the period that saw the first exploitation of domesticated plant and animal resources – agriculture – as well as other new cultural activities, including the making of pottery and the mining of flint. The defining features of causewayed enclosures are single or multiple concentric circuits or arcs of ditch, each interrupted by numerous gaps or causeways. The ditches would typically have been accompanied by an earthwork bank on the inner side. In some cases, excavation has shown that a timber palisade may also have been present. Only a small number of causewayed enclosures survive as earthworks (15 out of around 80 known in the British Isles), most having been identified as sub-surface features recognised from the air as cropmarks (Oswald *et al* 2001).

Recent analysis of radiocarbon dates has established that the earliest causewayed enclosures in Britain appeared in the 38th century BC, the practice flourishing through the 37th- 36th centuries BC, with a few seeing continued activity into the 34th and 33rd centuries (Whittle *et al* 2011). The considerable quantities of material culture often encountered in excavation have prompted suggestions of a wide range of communal, ceremonial and ritual roles for causewayed enclosures, with evidence for connections with other types of site and other regions of the

British Isles. At a time when populations were still relatively mobile, within the course of a cyclical, perhaps yearly, round of resource-exploitation within a wider territory, causewayed enclosures seem to have been places where larger groups periodically came together, but they were not 'settlements' as such.

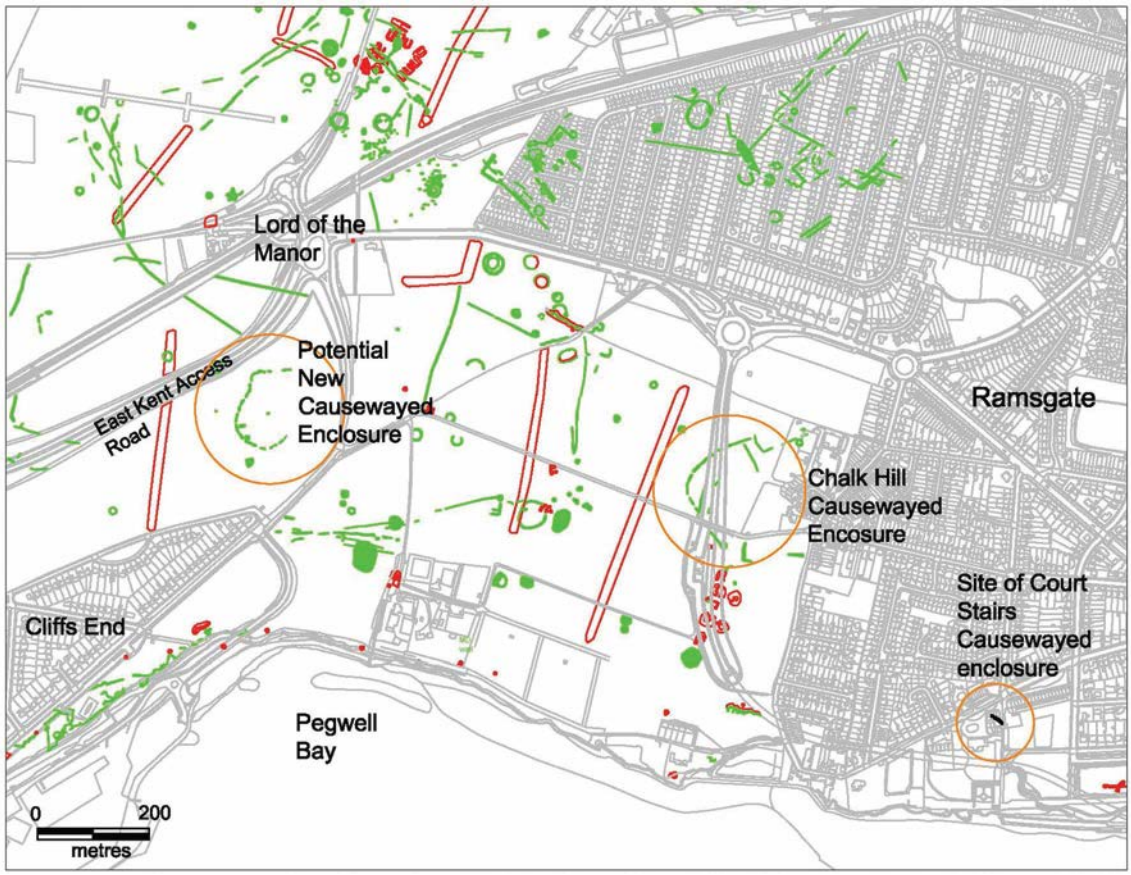


Figure 6: Extract of mapped archaeological features between Cliffs End and Ramsgate illustrating the locations of the two known and third potential Neolithic causewayed enclosures. Red indicates banks and mounds, green for ditches and pits © Historic England. Base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Known examples vary considerably in size, from less than half a hectare up to around 27 hectares, although most are below 6 hectares. Causewayed enclosures are usually located in one of three broad topographical zones – river valley floor, river valley side or upland locations. Those located in lowland contexts are frequently located close to rivers or streams, or associated with springs and confluences of rivers (Oswald *et al* 2001).

To date there are eight definite or probable causewayed enclosure sites in Kent: outside Thanet, three have been confirmed by excavation – Kingsborough, Sheppey where two sites occur just 300 metres apart (Allen *et al* 2008)) and Burham (Garwood 2012), while a fourth, near Eastry, has been recognised through cropmarks. On Thanet, a site near Margate originally rejected by Oswald *et al* 2001 (153, no. 49; see also Dyer1996) looks, on the basis of recent re-evaluation of aerial photographs, more likely to be a causewayed enclosure (Small, forthcoming), while three more lie within the Ramsgate HAZ project area (Fig 6). Two of these three

have been confirmed through excavation, while the third was identified in the course of this project. All three are located close to Thanet's southern coast, lying approximately 600m apart adjacent to natural dry valleys immediately west of Ramsgate, and each with views to Pegwell Bay and the English Channel beyond.

The first to have been discovered, situated a short distance to the west of Ramsgate at nearby Chalk Hill (Fig 7), was simultaneously identified in the 1990s through analysis of aerial photographs taken by RCHME in 1986 (Oswald *et al* 2001) and also during excavations in advance of the Ramsgate Harbour Relief Road (Clark *et al* 2019, 84-85). The site appeared to be a single arc of segmented ditches on the aerial photographs, but the excavations identified parts of three circuits of causewayed ditch and two possible interstitial circuits of pits, as well complex multi-period remains of ditches, trackways and pits, virtually none of which were evident on the aerial photographs. Analysis of radiocarbon dates obtained from animal bone in the ditch fills suggests that the ditches were probably first cut between 3,775 and 3,675 cal BC (at 95% probability), with the main phase of use at the site ending after c. 45-175 years (at 95% probability), somewhere between 3630 and 3530 cal BC (also 95% probability: Clark *et al* 2019, 84-85). Statistical modelling of radiocarbon dates (Whittle *et al* 2011, 691, 897) suggests that Chalk Hill may well be the earliest dated causewayed enclosure in the British Isles.

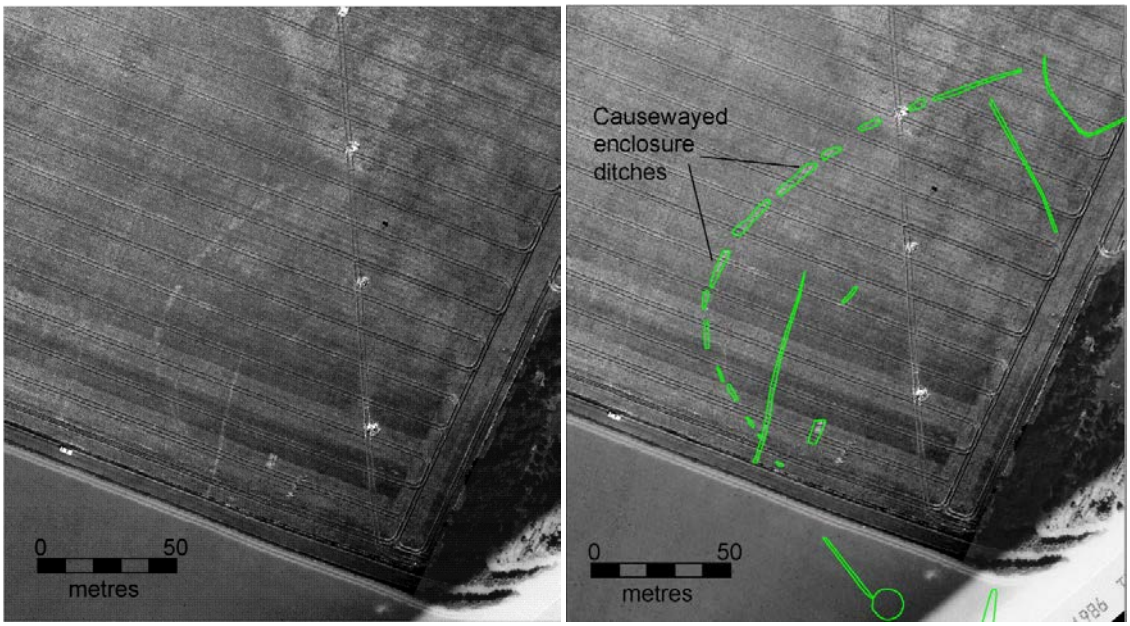


Figure 7: Extract from a 1986 aerial photograph showing the faint cropmark remains (left) and the same photograph with the transcribed remains of the circuit of segmented ditch of Chalk Hill Neolithic causewayed enclosure (right).This illustrates the difficulty in identifying these sites and the often slight nature of the cropmark in comparison with the remains surviving beneath the surface. Extract of NMR TR3664/6 NMR 3120/1059 06-AUG-1986 © Historic England.

The second of the two previously known sites is not visible on aerial photographs. It was found in 2007 beneath the building and gardens of Court Stairs Lodge on the outskirts of Ramsgate, in advance of housing development. Only two ditch segments were encountered in excavation, but finds including pottery suggested a

date of between 3800-3600 BC confirming this as a potential Neolithic causewayed enclosure (Moody 2008, 66-8) something underlined subsequently by radiocarbon dates ranging between 3605 and 3520 cal BC (at 82% probability) (G Moody pers. com.).

A third probable Neolithic causewayed enclosure has now been identified from aerial photographs taken in 2017 during a Historic England reconnaissance flight undertaken in advance of the Ramsgate HAZ project (Fig 3). It can also be seen on photographs accessible through Google Earth dated 9th April 2017 (Fig 8). Slight and ambiguous traces have subsequently been identified on earlier photographs already held in the Historic England Archive. This site is centred at TR 3539 6479, approximately 740m to the west of the Chalk Hill enclosure, and south-west of Lord of the Manor. It appears as an incomplete irregular arc of segmented ditches enclosing an area measuring circa 140m north-south (Fig 9). In common with Chalk Hill, the eastern side is not visible. This may be due to the fact that, as with the other two sites, the enclosure is located on the western side of a dry valley filled with deeper head sediments which may mask further remains. Cropmarks indicate the presence of two large pits on the inner side of the arc of segmented ditches, although it is impossible to be sure whether (or not) these are also of Neolithic date.

Figure 8: Aerial photograph showing the probable causewayed enclosure at Lord of the Manor as an arc of interrupted ditches (dark green on green) close to the centre of the photograph, against the background pattern/noise of geological markings. © GOOGLE.EARTH.CPM 09-APR-2017 ACCESSED 23-OCT-2019. (North is to the top of the image).

Morphologically, this potential new causewayed enclosure appears very similar to of the one at Chalk Hill, and as with the latter site, the cropmark evidence may represent only part of the true extent of buried features. At the very least, this site would benefit from geophysical survey to establish the completeness, or otherwise, of the enclosure circuit, and to ascertain the likelihood of any further internal (and external) features. A more detailed assessment of the aerial photographic evidence for the enclosure will appear in a separate report (Small forthcoming)

The route of the East Kent Access Road passes just to the north of the site. The construction site just missed the enclosure, but excavations undertaken in advance of the road improvements encountered other features including a cluster of pits containing flint and pottery dated to the Neolithic located c.200m to the west (Andrews *et al* 2015, 27). Assuming this site is a Neolithic causewayed enclosure, this represents a discovery of national significance, especially with the presence of three such sites within a 1.5km strip, and the very early dates already assigned to the Chalk Hill enclosure.

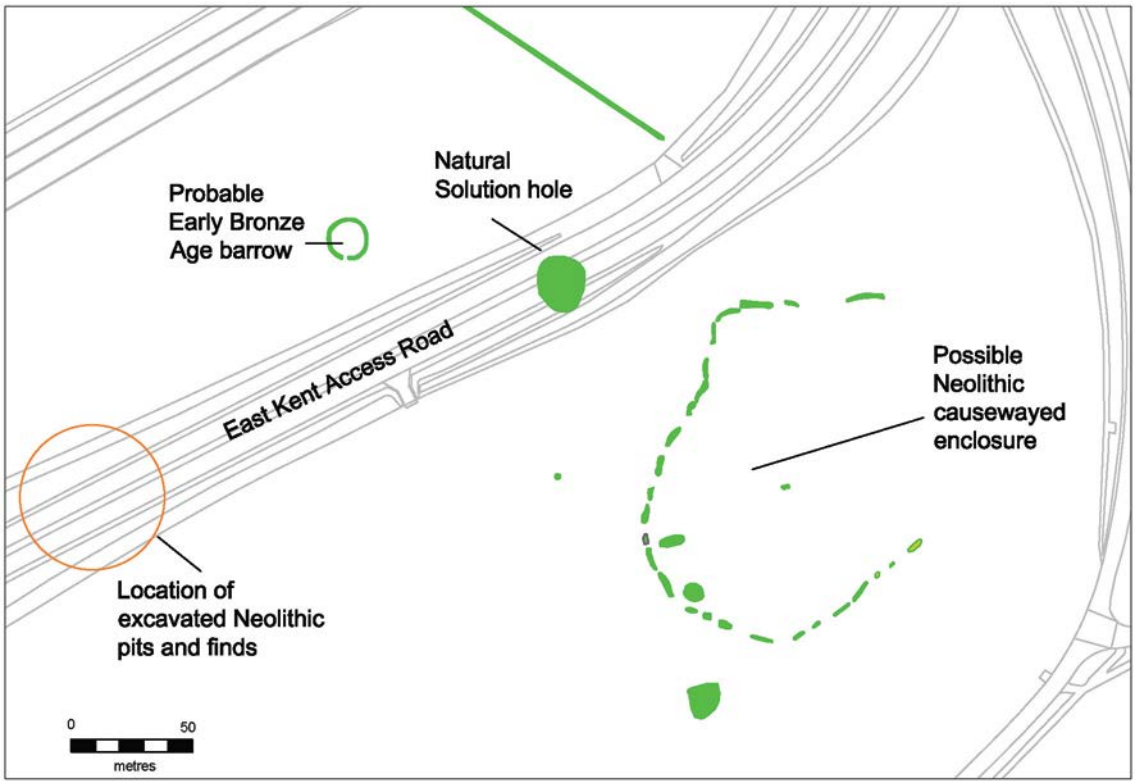


Figure 9: Transcribed cropmarks of the newly-identified possible causewayed enclosure. The large pit to the north-west was identified as a natural solution hole during the excavations for the East Kent Access Road. A cluster of Neolithic pits were also excavated to the west (Andrews *et al* 2015). Green indicates ditches and pits. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Funerary monuments

The Isle of Thanet has long been noted for its high concentration of funerary monuments, particularly those dating to the Bronze Age and the Early Medieval period. Potentially the earliest example of a funerary monument within the

Ramsgate HAZ survey area lies approximately 300m north-west of the Chalk Hill causewayed enclosure at TR 3593 6489, amongst cropmarks indicating the sites of a number of probable Bronze Age round barrows. Given the marked absence of Neolithic long barrows on Thanet (Perkins 2004) until now, this again is a potentially highly significant discovery.

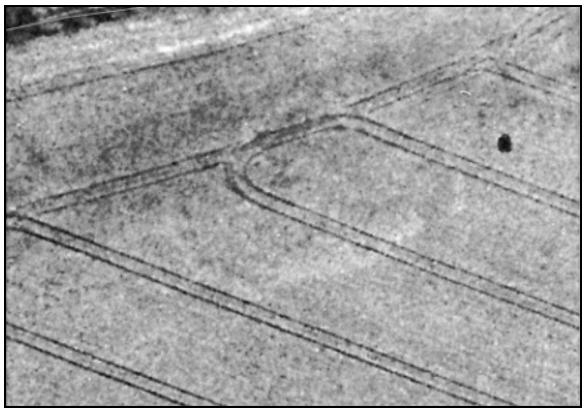
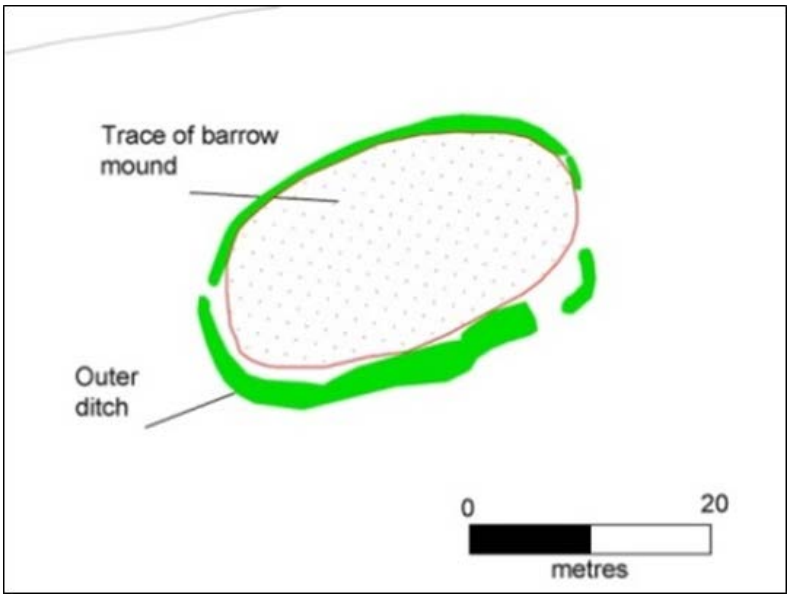


Figure 10: Extract of mapping (below) and photograph NMR TR3664/06 3120/1059 06-Aug-1986 (above) of the cropmark remains of a possible oval barrow seen on the western edge of Ramsgate; © Historic England Archive.



Aerial photographs taken in 1978 and 1986 (Fig 10) show the remains of a single capsule-shaped enclosure measuring 19m by 33m which may be the remains of a Neolithic oval barrow. This potential barrow is defined by a ditch forming an oval cropmark which appears to feature two or three small gaps in its circuit, although it is possible that the ditch itself may be continuous. The area inside the ditch is paler in tone, particularly on the 1978 photograph (MAL 78028/148 21-Aug-1978), this paler patch possibly representing the traces of a plough-levelled chalky mound measuring circa 30.7m by 16.5m and aligned ENE-WSW. The site lies just above and parallel to the 35m contour, the ground sloping gently to the south-east in the direction of the coast, which today is 650m to the south. It is also located at the

south-eastern end of a group of probable Early Bronze Age round barrows (see Fig 6).

Oval barrows represent a shorter variation of the Neolithic long barrow. The earliest dated long barrows in the British Isles were constructed in the 38th century BC. Unlike long barrows in general, which tend to have an elongated, sometimes trapezoidal or tapering mound flanked by a pair of side ditches, oval barrows often have a complete ditch around the entirety of an oval mound (Historic England 2018a).

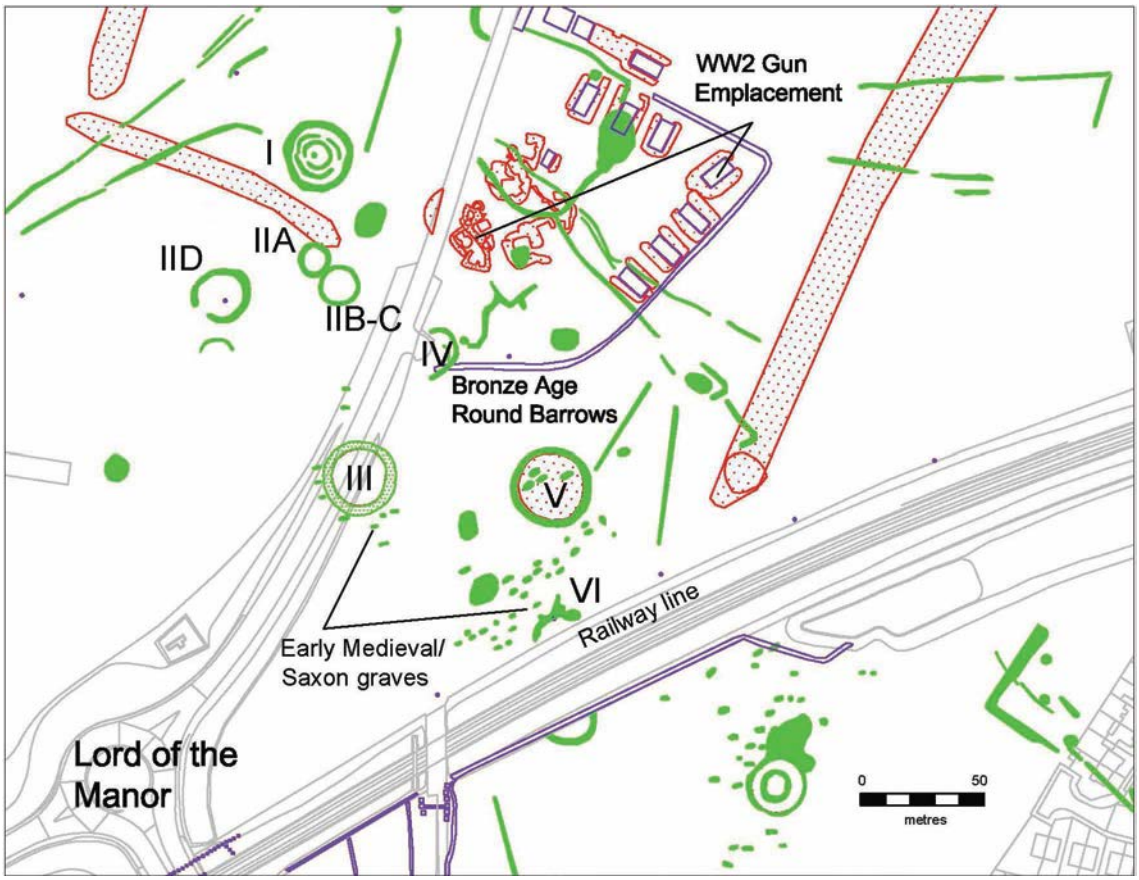


Figure 11: Extract of mapping illustrating levelled early Bronze Age round barrows amongst the remains of Early medieval graves and Second World War gun emplacement between Lord of the Manor and Ozengell Grange (to the north). Barrow numbering after Moody 2008. Red indicates banks and mounds, green for ditches and pits, purple for structures © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

The late Neolithic and Early Bronze age saw a proliferation of round barrows, the simplest form being a circular ditch surrounding an earthen mound beneath which a burial or cremation was placed. Secondary burials were frequently inserted into the mound or surrounding ditch. The main period of round barrow construction occurred between circa 2000-1500 BC, though the earliest date from before 3000 BC. In intensively arable areas such as East Kent, few if any still feature above-ground earthwork survival, but the buried remains of the surrounding ditch circuits are frequently seen as cropmarks, and occasionally traces of the former mound or even a burial pit can be seen as a cropmark or soilmark. Additional concentric ditch

Figure 12: A composite view of two aerial photographs (joined along the line of the N-S road) showing the cropmark traces of early medieval graves (small oval or elongated dark marks) amongst the cropmarks of several Bronze Age round barrows between Ozengell Grange and Lord of the Manor (TR 3555 6530). Grave cuts can be seen in the pale chalky interior of the barrow to the right of the N-S road, cut into the barrow mound which may already have been levelled by the early medieval period. Extracts from NMR TR 3565/08 4135/78 18-Jul-1988 © Historic England (left) and CUCAP AFK96 14-Jun-1962 Cambridge University Collection of Aerial Photographs © Copyright reserved (right).

circuits may indicate either a more complex construction or subsequent phases of enlargement or embellishment (Historic England 2018b).

Bronze Age round barrows are the most numerous features seen as cropmarks across the survey area and on the Isle of Thanet as a whole (see Last 2019 for a discussion focused on Ramsgate and its immediate environs). The sites of more unrecorded barrows may well lie beneath the developed areas of Ramsgate and the adjacent towns, although in truth there are very few known antiquarian finds suggestive of lost or destroyed barrows from within Ramsgate itself.

All of the mapped barrow sites were indicated by the presence of ring ditches, these ranging in size from 8m to 37m in diameter, but in a few cases the area enclosed by the ring ditch appeared more pale than the area outside, suggesting the possible presence of a plough-spread chalky mound. Most barrows were defined by a single ring ditch, but a few examples exhibit two, and in some cases three concentric ditches, potentially indicating a more complex monument or more than one phase of construction.

Excavation of a number of possible barrows on Thanet has underlined the potential complexity of these sites, as well as the uncertainty that can remain over their interpretation even after excavation. A group of suspected barrows at Lord of the Manor, Ozengell, (Isle of Thanet Archaeological Unit 1980; Moody 2008, 74-5) was investigated in the 1970s, with some suggested to have originated as late Neolithic 'hengiform' monuments which subsequently became funerary monuments. In the case of Lord of the Manor Site 1, this involved the addition of further ditch circuits, with burials inserted in and around the enclosure, suggesting multiple phases of activity over a period of time. (Isle of Thanet Archaeological Unit 1980; Moody, 2008, 73-5; Perkins 2010, 283). However, as Last (2019, 9-10) has pointed out, the evidence for any of the Lord of the Manor sites originating in the pre-Beaker late Neolithic as henges (or 'hengiforms') is highly debatable.

These monuments at Lord of the Manor (Figs 11, 12) are greatly outnumbered by the much later graves of an extensive sixth to seventh century AD early medieval inhumation cemetery, with some graves cut into the mounds and ditches of the barrows, which by this time will have been at least two thousand years old. Some of these grave cuts are visible on aerial photographs (e.g. NMR TR 3562/8 18-Jul-1988 and CUCAP AFK96 14-Jun-1962). Iron Age and Roman burials were also found during excavations, but distinguishing occasional burials of earlier, i.e. pre-early medieval, date is rarely possible from aerial photographic evidence alone. Cropmarks indicating the buried traces of Second World War trenches associated with a Heavy Anti-Aircraft battery (HAA) have also been recorded to the east of the road.

Cropmarks indicating further ring ditches lie to the south-east of Lord of the Manor, beyond the railway line, to the south of Nethercourt on the outskirts of Ramsgate. These suggest the presence of at least twelve further barrows (Fig 13). As at Lord of the Manor, these represent a variety of forms and size of circular enclosure. Most appear to be single ring ditches, although one (A) has a second outer circuit defined by a broader, more regular ring ditch, possibly representing two phases of activity

or a complex original form. To the south-east of this site is a smaller penannular ditch (F), with an internal pit.

Two adjacent ring ditches (B and C) have possible traces of an internal mound visible as a pale cropmark contained within the darker surrounding ditch. As at Lord of the Manor, the prehistoric remains are interspersed with cropmarks indicating the buried remains of Second World War defences in the form of zig-zag slit trenches, as well as a number of fragmented linear ditches and banks associated with former field boundaries of uncertain date.

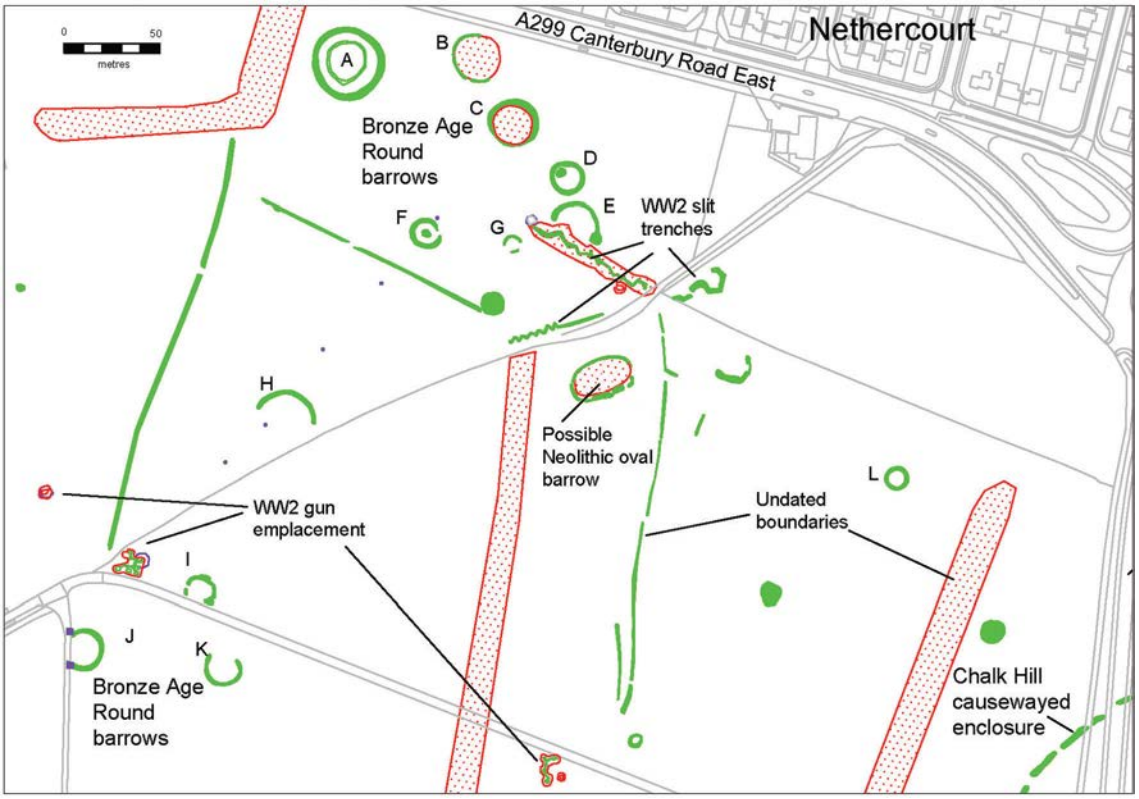


Figure 13: Transcribed cropmarks of round barrows, pits and boundaries from multiple periods in field to the south of Newington between Ozengell Grange and Chalk Hill. Also visible are the remains of WW2 slit trenches, gun emplacements and slight linear boundaries of uncertain date. Red indicates banks and mounds, green for ditches and pits © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Another group of probable Bronze Age round barrows lies to the north-west of Ramsgate in an area which has now been developed for the Westwood Cross Retail Park (Fig 14). Aerial photographs taken prior to the development recorded cropmarks indicating a spread of infilled pits. To the south, more cropmarks show traces of a group of ring ditches (two complete and three partial) likely to represent the remains of round barrows. The eastern three ring ditches form a closely spaced linear grouping aligned NW-SE. The cropmarks in this area are generally patchy, possibly due to the underlying geology which is here dominated by superficial sediments, including Brickearths, which are typically less responsive to cropmark generation. To the south are playing fields, but no significant parchmarks or cropmarks appear to have formed here since the area was first photographed by the

RAF during the Second World War. Fig 14 also shows the faint and ambiguous cropmarks of a possible triple-ditched sub-circular enclosure to the north-east of Haine Farm. This feature is discussed below (pp 21-22).

Within the built-up areas of Ramsgate, open spaces such as parks, playing fields and surviving farmland have the potential to provide small windows on the earlier history of the town, as cropmarks or parchmarks may form given the right conditions. One such area is the fields around Newlands Farm, West Dumpton which is now the site of Ellington School. Cropmarks of several ring ditches, again likely to represent Bronze Age round barrows, have been seen on aerial photographs along with fragments of other features immediately north of the railway line and east of Newlands Farm (see Fig 16).

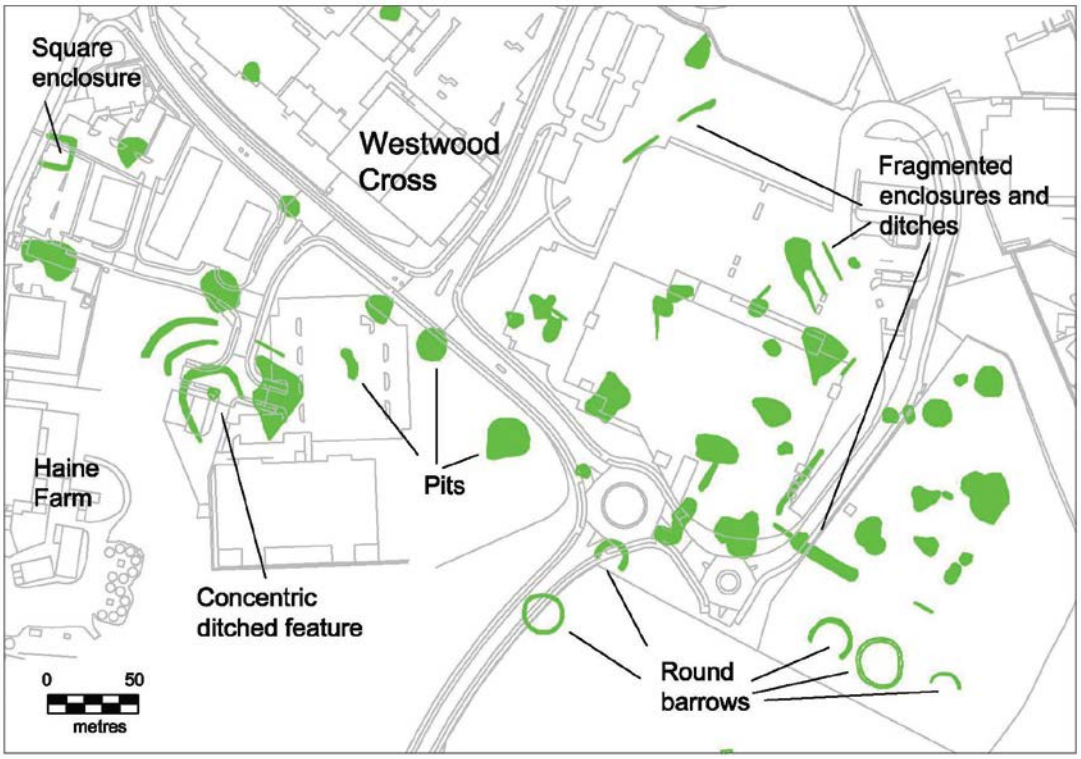


Figure 14: Cropmarks of Bronze Age round barrows, enclosures and pits visible on aerial photographs taken prior to the building of Westwood Cross Shopping Centre. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Enclosures

A triple concentric ditched sub-rectangular enclosure, revealed as cropmarks and located immediately to the north of Haine Farm (Figs 14, 15), is recorded on aerial photographs taken by RCHME in 1984 and again in 1988. However, the site appears not to have been identified prior to this project. The innermost enclosure measures 32m by 49m, and the visible traces of the outer two ditches suggest dimensions of at least 60m by 90m, but it is likely to be considerably larger if the outer circuit is complete. There is a large pit within the innermost circuit, but this may relate to later quarrying as the enclosure is surrounded by cropmarks

indicating remains of numerous pits of varying size which probably represent medieval or later quarrying. The triple-ditched feature is unlikely to be geological in origin, but without further investigation, its exact nature and date remain under question. Excavations at Cliffs End Farm (McKinley *et* al 2014, 19023) identified three late Bronze Age – middle Iron Age sub-rectangular ditched enclosures with similarities in shape and dimension to the inner-most circuit of the Haine Farm site, but the potentially triple-ditched form is harder to parallel. The feature now lies beneath the car park and buildings of a Sainsbury's Superstore at the Westwood Cross Shopping Centre. The course of the planned approach roads were excavated prior to the development, as were other parts of the Shopping Centre, but there is no reference to this feature in published reports.

Figure 15: Faint cropmarks of a possible triple concentric ditched enclosure and scattered irregular pits seen to the north-east of Haine Farm. NMR TR3667/22 2176/975 03-AUG-1984 © Historic England.

However, despite the chalk beds outcropping in this area, some archaeological features known to be present here have not been seen as cropmarks. Excavations at the site of Ellington School (off Pysons Road, Ramsgate), just to the west and north-west of the cropmarks shown in Fig 16, revealed a complex and extensive group of multi-phased features. These seem to have produced little cropmark evidence in over fifty years of aerial photography over Ramsgate. Dispersed across a large area were the remains of ditches, enclosures and pits associated with settlement, field systems and funerary deposits. Most datable features belonged to the later Bronze Age or earlier Iron Age periods (essentially the first half of the first millennium BC), although pottery and flint work recovered from a number of deposits suggested earlier Neolithic activity in the area, while a funnel-shaped enclosure made up of lengths of segmented ditch may be of Neolithic origin (Boden 2005).

Further to the east, at South Dumpton Down, a large lozenge - shaped enclosure has been interpreted, following partial excavation during the 1990s, as the remains of a middle Bronze Age settlement (Moody 2008, 99,104; see also Barber 2003, 49). The enclosure, which contained a number of pits and was possibly associated with a trackway, has now been built upon, but cropmarks on aerial photographs taken in

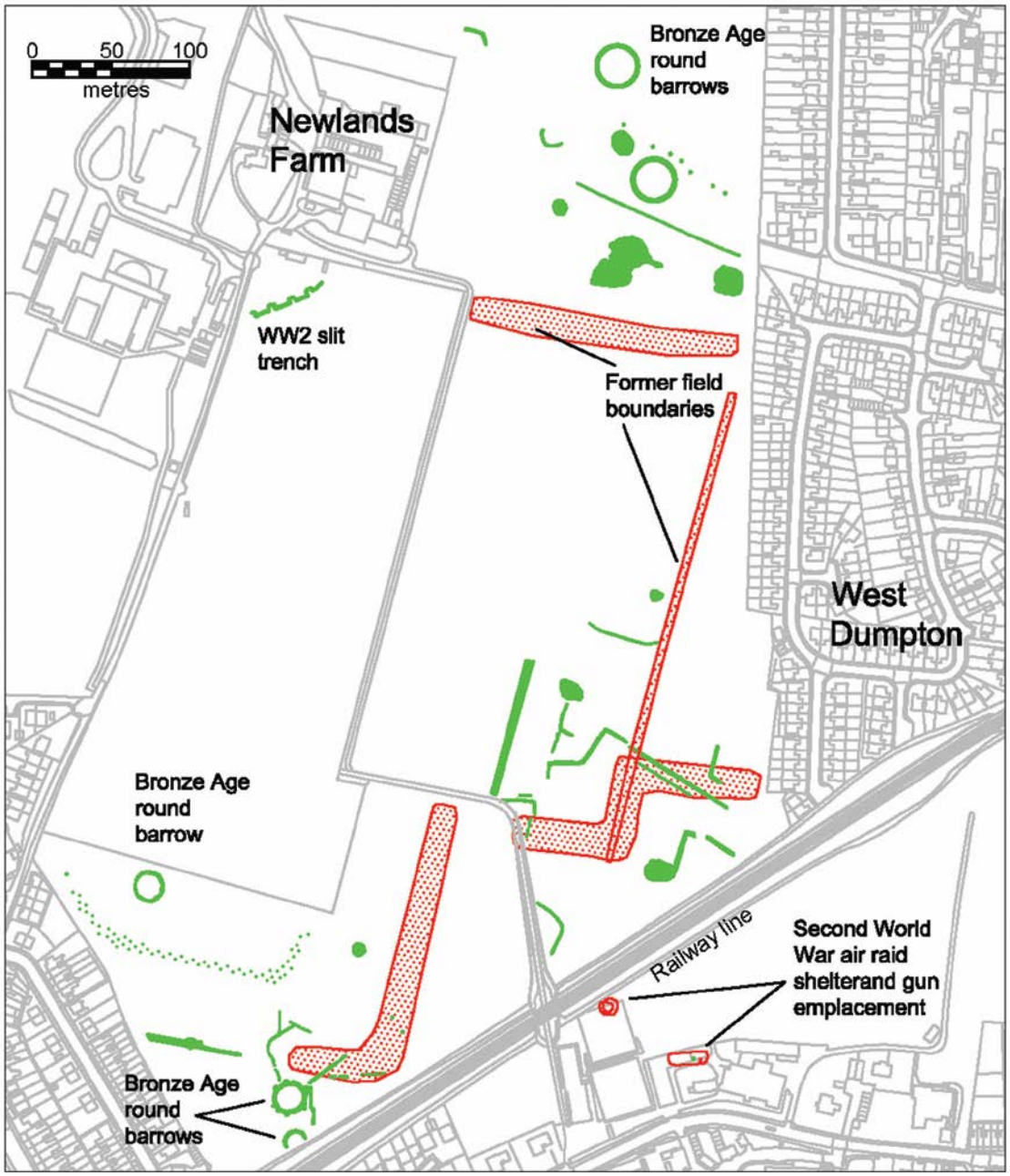


Figure 16: Features seen as cropmarks (in green) at West Dumpton adjacent to Newlands Farm. Ellington School lies immediately to the SW of the farm. The remains of fragmented ditches, probable Bronze Age round barrows, and other features represent a fraction of the true extent of the buried remains, as indicated by excavations in the area. Also visible are possible Second World War trenches south of Newlands Farm and a curving alignment of multiple pits from a former hedge plantation visible to the south-west. The former field boundaries were seen as low banks on lidar. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

1951 (e.g. RAF/58/688/PART 3 5005 23-MAY-1951) show the southern half of the enclosure as well as further ditch fragments of a similar nature and a number of pits 160m further to the north-east (Fig 17). An arc of ditch measuring 35m in diameter, possibly representing a large ring ditch, can also be seen a short distance to the north. A plan produced by the Trust for Thanet Archaeology (Moody 2008, 104) shows the entire enclosure, more than can be discerned from the RAF photographs available for this HAZ survey.

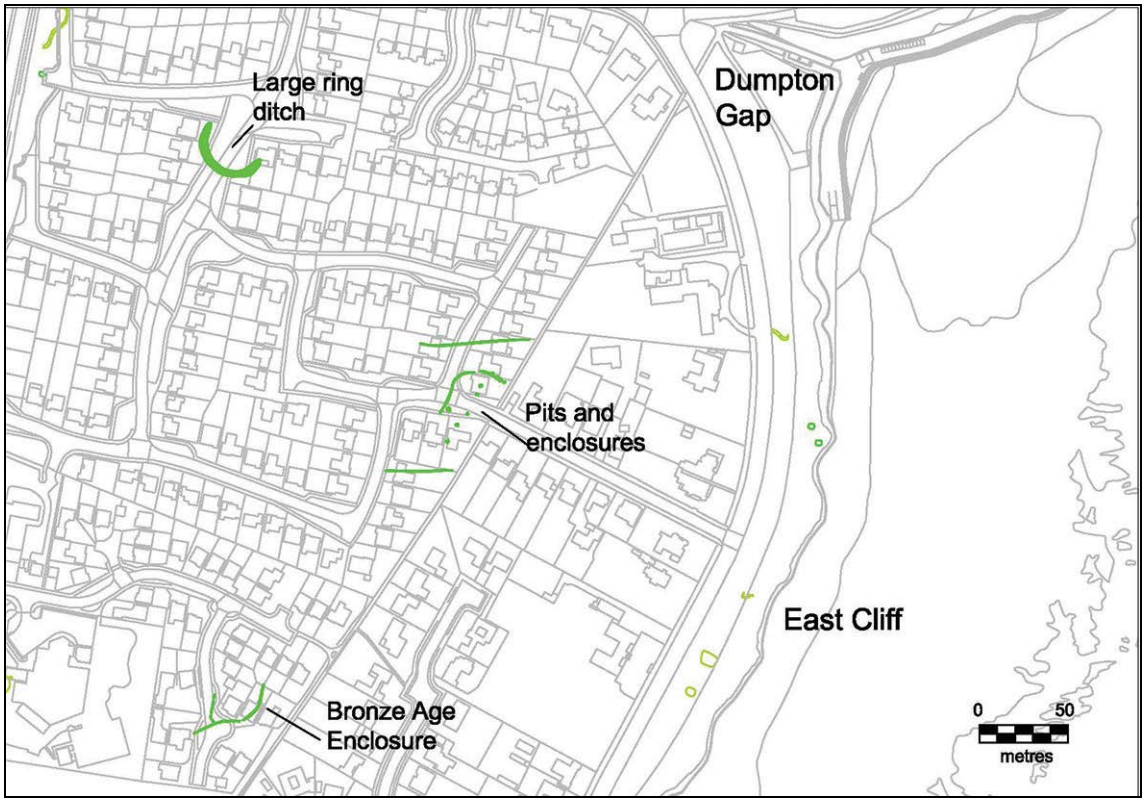


Figure 17: Fragmented cropmarks of a number of probable later prehistoric sites at South Dumpton Down seen on aerial photographs prior to development, hinting at the once extensive settlement remains known to have occupied this area. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Pits and quarries

Aerial survey and excavation on Thanet has revealed the earthwork, cropmark and buried remains of quantities of pits of varying size and shape. In many cases these probably represent backfilled quarry pits, but in a number of instances there are other possible explanations, their interpretation often aided by map or other documentary evidence. Natural processes have also resulted in the presence of solution holes in the chalk. A number of these have been identified across Thanet, with one example identified at Cliffs End during the excavations undertaken in advance of the East Kent Access road (Andrews *et al* 2015).

Most of the pits mapped in the project area occur over the areas of outcropping chalk, and are likely to represent quarry pits of uncertain, though potentially

relatively recent, date which may have been dug to exploit the chalk, or possibly the clay and sand deposits which can cap the chalk bedrock in this area. Deeper chalk beds were also quarried by sinking a shaft or well through the surface deposits such as the Thanet Sands to extract the chalk rock beneath. Known as dene holes, these were a medieval form of chalk extraction, quite widespread across the chalk of Kent, and some later post medieval (17th to 19th centuries) examples have also been identified. The earlier, medieval, Dene holes were typically a circa1m diameter shaft with cut footholds in the shaft walls, leading to chambers in the chalk below. The later form, known as chalkwells (or draw wells), were sunk in areas where the chalk was capped with heavy clay. These were typically 1.5 to 2m in diameter with two to four roughly cut chambers radiating from the base of the shaft. These were often dug close to field boundaries to minimise the likelihood of subsidence in areas likely to be ploughed (see e.g. https://www.subbrit.org.uk/sites/darenth-wood-dene-hole/).

Other pits encountered could be associated with settlement sites – examples have already been noted at excavated sites, such as the Middle Bronze Age enclosure at South Dumpton (Moody 2008, 123), but in the absence of other associated features, such as an enclosure ditch, it is difficult to interpret them as settlement features with any certainty. A large shallow pit was excavated in 2005 in the eastern half of the Westwood Cross development which produced Late Bronze Age pottery and was interpreted as a possible pond or water hole measuring 11m by 5.5m (Poole and Webley 2008).

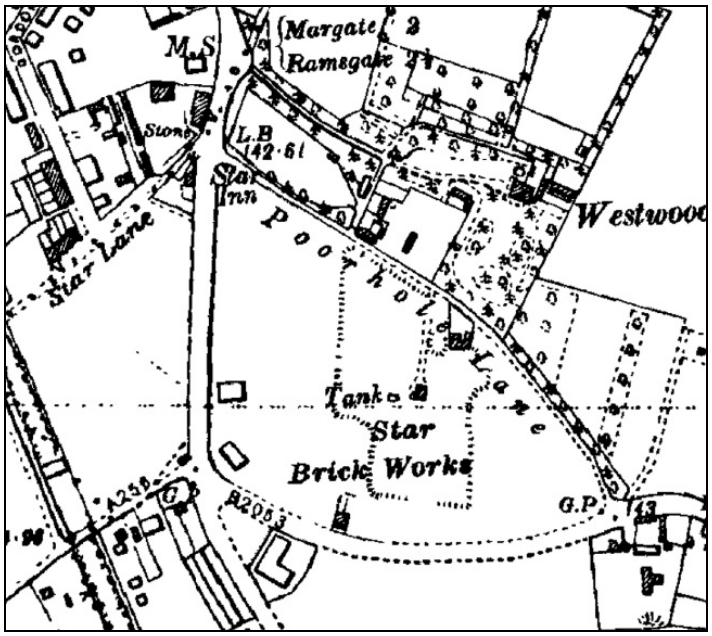


Figure 18: The site of the early 20th century Star Brickworks at Westwood depicted on the 1936 edition of the OS 1:10,560 map. © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2019) Licence numbers 000394 and TP0024.

The two main mineral resources on Thanet are the chalk rock and its overlying sediments such as clays and Brickearths. Brickearths are silty loams associated with river terrace and flood plain sediments, and in recent centuries these have been

exploited particularly for the production of bricks. These deposits are generally a few metres thick and located close to the surface, making extraction relatively easy. A concentration of pits visible as cropmarks to the west of Northwood coincides with deposits of Brickearth. Elsewhere around Ramsgate – and across Thanet - the Brickearth deposits were exploited for brick making from the 19th century as the town expanded. 19th century Ordnance Survey maps of Ramsgate record numerous small brickfields around the town where the clay was extracted for brick making.

Figure 19: The Star Brickworks clay pit had been filled in by the time of this 1941 aerial photograph. Extract of RAF HLA/380/PORT/653 15-DEC-1941 Historic England Archive (RAF Photography).

The Star Brickworks at Westwood appears to have been one of the larger brickworks in the area. Established in the first quarter of the 20th century, by the 1930s the brickfields here had extended northwards to the edge of Poorhole Lane, as the peripheries of the expanding town of Ramsgate had reached as far as Westwood (Fig 18). By December 1941 the site had been cleared and in-filled (Fig 19). The disturbed ground was still visible as cropmarks and slight earthworks when photographed by the RAF in 1951 (Fig 20). The early maps reveal the sites of a number of brickworks at Westwood extending along the northern side of the Westwood Road. The extensive clay quarries and brickfields potentially removed archaeological deposits. This, along with the moisture-retaining tendencies of these soils, which makes them less likely to promote the appearance of cropmarks, helps to explain the lack of archaeological remains visible on aerial photographs in this part of Thanet.

Figure 20: Cropmarks and slight earthworks recorded in 1951 indicating the extent of made made ground at the site of the former Star Lane Brickworks visible in 1951. Extract from RAF/58/616/V/5016 05-APR-1951 Historic England Archive (RAF Photography).

Settlements and fields

Excavations and chance finds have established the presence of settlement from all periods within the built-up areas of the modern town. Aerial photography of open spaces such as parks and school playing fields, as well as and arable farmland within and around the urban area, also offer particularly valuable windows on what may lie beneath Ramsgate.

Two particularly significant areas of probable later prehistoric and Roman settlement have been noted in fields to the west of Ramsgate. One site occupies a pair of large fields to the south of Manston Court Road at Lydden (Figs 21, 22). The cropmarks coincide with the outcropping of the chalk bedrock at the surface, and have been photographed on many occasions over a period of decades. However, it is possible that the clay and silt deposits to the east and west are masking further sites.

The main features visible are a complex of rectilinear and rectangular enclosures, and a NNE-SSW aligned double-ditched trackway. The slight earthwork remains of embanked former field boundaries (depicted in red on Fig 22)) extend across this area and were recorded from lidar images – similar features have been noted on the lidar elsewhere around Ramsgate. These banks have been largely levelled or spread, probably by 19th century and later ploughing, so they appear as broad but slight embankments on the lidar images. Their date is uncertain - they appear to lie above and therefore post-date the later prehistoric and Roman features, but they do not

feature on the 19th century Ordnance Survey maps, suggesting they fall somewhere between these two extremes. On balance, a medieval or post-medieval date seems most likely, and they would clearly warrant further research.

Figure 21: Distribution of the archaeological cropmarks (dark green) in relation to the presence of chalk (pale green). This contrasts with areas of clay and silt deposits which mask remains, and Thanet beds (blue) which are less conducive to cropmark formation. Left of centre is a large probable later prehistoric and Roman settlement south of the Manston Court Road at Lydden (see Fig 22). © Historic England; contains British Geological Survey materials © UKRI 2019; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Returning to the cropmarks, the presence of more than one phase of occupation is evident not just from the fact that some features clearly cut across others, but also from the very different orientations that are visible. For example, on the western side of the trackway there is a marked NW-SE axis to the enclosures and ditches, whereas those on the eastern side appear more closely integrated with the NNE-SSW line of the trackway itself. While some of the enclosures visible are likely to represent the location of settlement sites, many of the linear and rectangular arrangements of ditches, some of them quite fragmentary in appearance on the aerial photographs, probably represent associated fields. The cropmarks do not continue over the deeper sedimentary deposits to the north-east, and to a lesser extent to the south-west, so the full extent of settlements and associated field systems could be much greater than is apparent from the cropmarks.

To the south of what appears to be the main concentration of settlement, there is a short line of pits, possibly the post holes of a former boundary aligned north-south

(Fig 22). 12 pits were seen over a distance of 55m, apparently extending south from an E-W aligned possible later prehistoric or Roman track. It is worth noting that the pits appear to heading towards the site of a round barrow. This could mean that the pit alignment is contemporary with the original use of the barrow, or alternatively that the mound may have been incorporated into a much later series of boundaries.

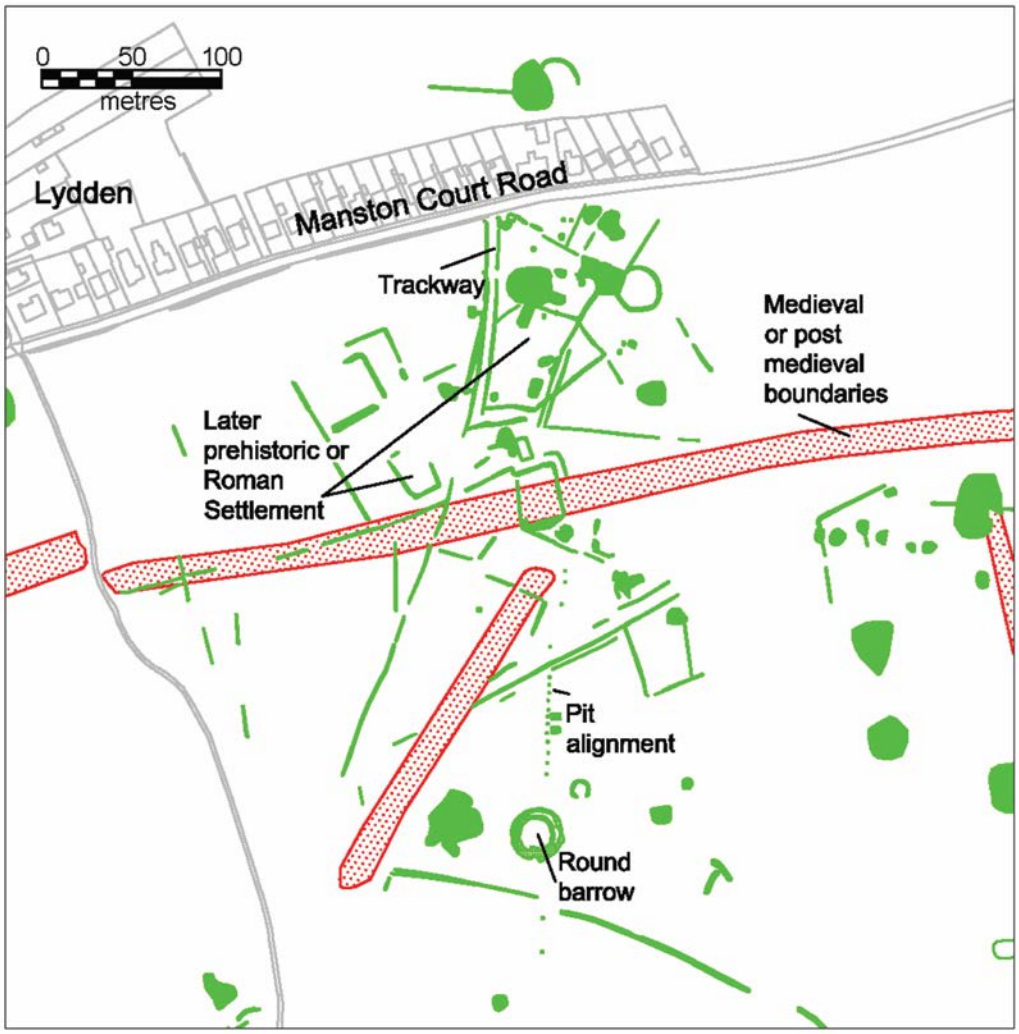


Figure 22: Cropmarks (in green) of extensive ditched later prehistoric or Roman settlement and traces of an associated field system in fields south of Manston Court Lane, Lydden. The red indicates the slight earthworks of probably medieval or post medieval field boundaries. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

The second area of probable later prehistoric or Roman settlement now lies beneath the 1950s development of Nethercourt (Figs 23, 24). Since the Second World War there has been considerable development on the fringes of Ramsgate, extending the built-up area out onto formerly agricultural land. Historic aerial photographs document these developments as well as capturing cropmark traces of archaeological sites before they were lost from view beneath housing.

There are faint, sometimes fragmentary cropmarks of ditches and pits, probably representing an Iron Age or Roman settlement plus associated fields, recorded on a very oblique and over-exposed aerial photograph in the Cambridge University Collection of Aerial Photographs (CUCAP) taken in 1959 (Fig 24). The photograph shows the housing development – which in time would cover the area containing the cropmarks – already well underway. Features recorded on the aerial photograph include several conjoined rectangular ditched enclosures, one containing a possible hut circle. There are also parts of at least six ring ditches, all possibly representing levelled Bronze Age round barrows, plus a large oval ditched enclosure probably of later prehistoric date measuring 41m by 52m.

Chance discoveries of various dates from the Neolithic through to the Anglo-Saxon period were made as the housing was constructed, but it is difficult to relate these directly to the cropmark evidence. For example, in October 1949 a large pit containing two Neolithic burials – both inhumations – plus sherds of an Early Neolithic plain bowl was encountered while cutting drainage trenches in what is now Grummock Avenue. The potsherds had apparently been spread out over the lower of the two burials as if to cover it (Dunning 1966, 9-11).

Figure 23: Traces of a probable Iron Age/Roman settlement (right) and Roman villa (left) now beneath housing at Nethercourt, Ramsgate. The approximate location of Iron Age finds from Thirlmere Avenue in 1963 is starred. © Historic England; © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

During sewage works in Thirlmere Avenue in 1963 two Iron Age pits, both approximately 5 feet deep and 5 feet in diameter were discovered. They contained Iron Age pottery and a number of other finds including animal bone, flint, ironstone and whelk shells (see Figs 23 and 24). Both pits may have had flat bases floored with stones. Anglo-Saxon graves have also been discovered in the general area, the earliest being found in the late 1890s, with more found as housing development spread across the area, particularly during the 1940s and 1950s (Stebbing 1951).

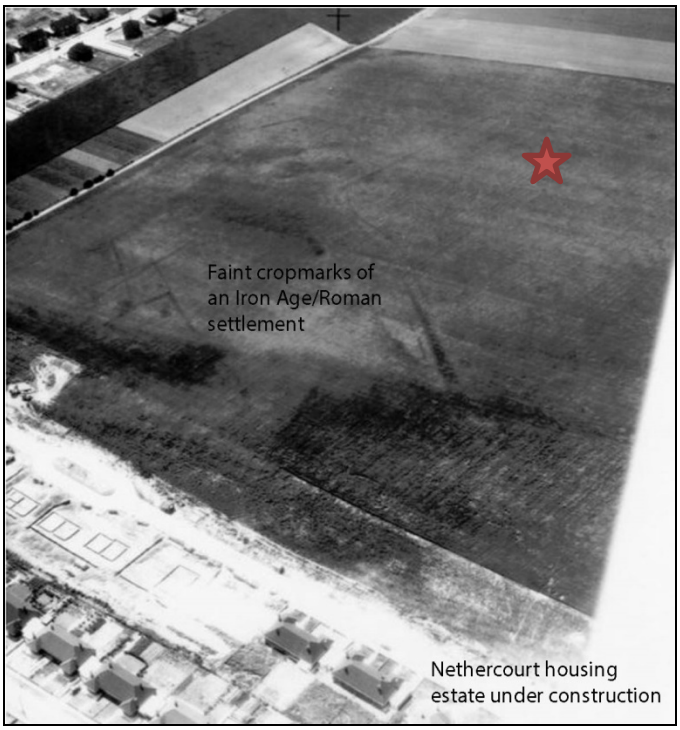


Figure 24: Extract of aerial photograph CUCAP YH 33 16-JUN-1959 showing the faint cropmarks at Nethercourt. The roads and house foundations can be seen alongside completed houses. North is to the right. The star again marks the approximate location of Iron Age finds from Thirlmere Avenue. Cambridge University Collection of Aerial Photographs © Copyright reserved.

Roman settlement

Considering the known Roman presence on Thanet, remarkably little that is distinctively Roman was recorded during this survey. Only one confirmed Roman settlement site was identified, and it was not a new discovery. The cropmarks of this site are extremely unlikely to represent its full extent, but they indicate the presence of a complex of large rectangular ditched enclosures plus some pits centred at TR 3586 6522, on the western edge of the Nethercourt estate between the A299 Canterbury Road and the railway line (Figs 23, 24). Excavations carried out by Isle of Thanet Archaeological Unit on the site in 1977-82 and 1982-3 revealed the remains of a possible Roman domestic site within a ditched enclosure covering 4 acres. The complex comprised a number of buildings with flint walls and timber frames, possibly a farm villa and its outbuildings (Isle of Thanet Archaeological Unit 1988, Record No. 160). The earlier phase of excavations identified rammed chalk floors and shallow cellars, with evidence suggesting that some of the buildings were buttressed. Pottery from the site was mid-first century in date. Although the majority of this site now lies beneath the housing development of Nethercourt, a small portion of the site still survives as a sub-surface feature in the field between the western end of the development and the railway, and it is possible that fragments survive beneath the gardens of the Nethercourt estate. The portion of the site visible on historic aerial photographs (e.g. CUCAP VB 48 14-JUN-1957 and NMR TR3565/29 1056 06-AUG-1986) show the cropmark traces of a number of large pits which may be evidence of later robbing of masonry during or after the Roman period.

Aerial photographs from May 1951 have revealed an enigmatic parchmark within a narrow strip of grass in the housing developments of Whitehall (Fig 25). The feature has the appearance of a building foundation similar in form to the typical remains of a Roman villa. No previous record for this site has been found, and assessment of historic maps has failed to cast any light on the site. Whether this is in fact the remains of a medieval or later, perhaps even 20th century, building or structure remains to be ascertained, but there is a possibility that it represents evidence of the elusive Roman settlement of the area, which is otherwise known from finds, burials and fragments of buildings uncovered over the centuries in and around Ramsgate.

Figure 25: Left: extract from a 1951 RAF aerial photograph plus right: transcription showing parchmarks of possible buildings foundations visible in grass within Whitehall estate, Ramsgate. Extract from RAF/58/688/VP3/5017 23-MAY-1951 Historic England Archive (RAF Photography); © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Upper Court and Nether Court Manors

Cambridge University aerial photographs taken in 1959 (Fig 26) show the cropmarks of a large multiple ditched rectangular enclosure, with traces of what appear to be the buried masonry foundations of buildings, located between the railway line and the St. Lawrence to Manston Road, approximately 500m east of Ozengell Grange. This is almost certainly the site of the medieval manor known as Upper Court (formerly the Manor of St Laurence), a medieval manor house which was probably demolished in the late 17th century. The supposed site of the manor was identified by Charles Cotton, who wrote that '*in very dry weather the site of the foundations of the building may be traced out upon the parched ground, though the house was demolished before the reign of Queen Anne.*' (Cotton 1895, 168; Queen Anne's reign began in 1702).

The manor's chapel survived a little longer than the house before being demolished and the stone reused – 'part of the ruins of the chapel...were remaining, but a few years since, when they were carried away and applied to the building of a barn wall

just by' (account by Lewis 1735-36, cited in Cotton 1895, 168). Fragments of upstanding wall footings of the supposed manor were said to still be visible at the site in the 1950s (Hutcheson and Andrews 2009, 201)

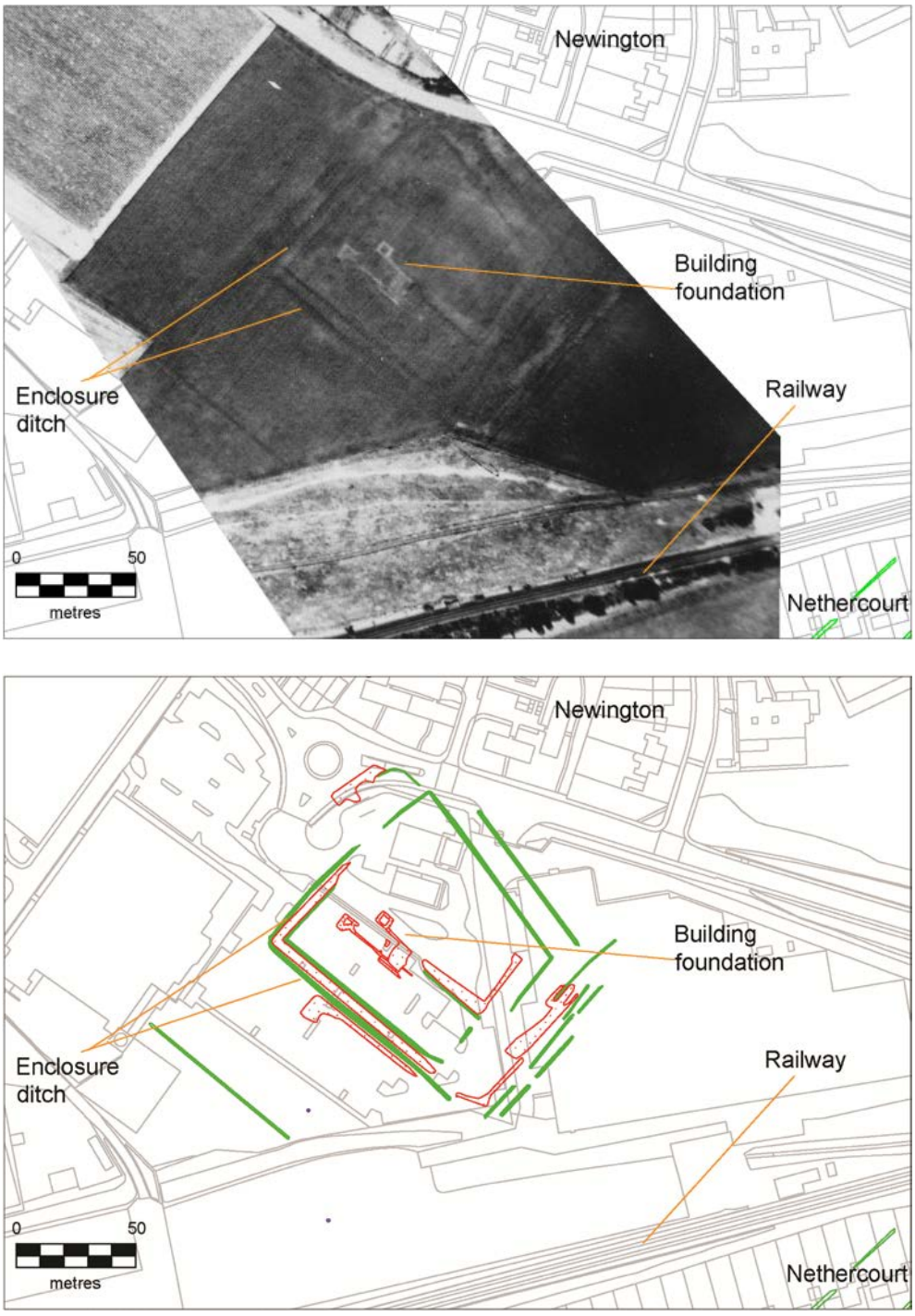


Figure 26: Above: rectified 1959 aerial photograph showing cropmarks indicating the buried remains of Upper Court Manor: CUCAP YH37 16-JUN-1959 Cambridge University Collection of Aerial Photographs © Copyright reserved. Below: transcription of the site. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

In response to a planning application to develop the site by Tesco, the area immediately to the west of the probable cropmarks of the manor was fully excavated and parts of the enclosure sectioned and sampled. These excavations confirmed that the site did indeed represent the medieval manor of Upper Court. Because only small areas were examined, and little dating evidence was encountered, it remains possible that there were as yet unidentified earlier phases. The evidence obtained suggested a date spanning the 14th-15th centuries for the large multiple-ditched enclosure, with pottery evidence suggesting that some or all of the ditches were in-filled by the end of the 15th century. Traces of the footings of parts of the inner building were located and found to be chalk and flint rubble in construction, and a sherd of 14th -15th century pottery found. It is also worth highlighting that Early Neolithic, Bronze Age, and early medieval features were encountered in the excavations (Hutcheson & Andrews 2009). The site now lies beneath a large vehicle depot and associated landscaping.

Figure 27: Aerial photograph of Nethercourt Park (below centre; compare with Fig 28) taken in 1950. Note the white outlines of the streets and a few newly constructed houses, part of the initial development of the Nethercourt housing estate immediately to the north of the house and grounds. Extract from RAF/541/484/RS/3006 07-APR-1950 Historic England Archive (RAF Photography).

The site of a second medieval manor, known as Nether Court (Figs 27, 28), was located c.650m to the south-east of Upper Court and immediately to the south of the village of St Laurence (Cotton 1895, 169). Upper Court, located on rising ground, was so called – presumably because it was on higher ground – to

distinguish it from the neighbouring manor Nether Court. The manors were combined into a single ownership at some point either during the reign of Elizabeth I (1558-1625) or Charles I (1625-1649), according to various sources (Cotton 1895, 167). Upper Court appears to have been abandoned in favour of Nether Court. Part of the manor grounds survive as Nethercourt Park, but the house was demolished in 1957 prior to the construction of the housing estate which bears its name.

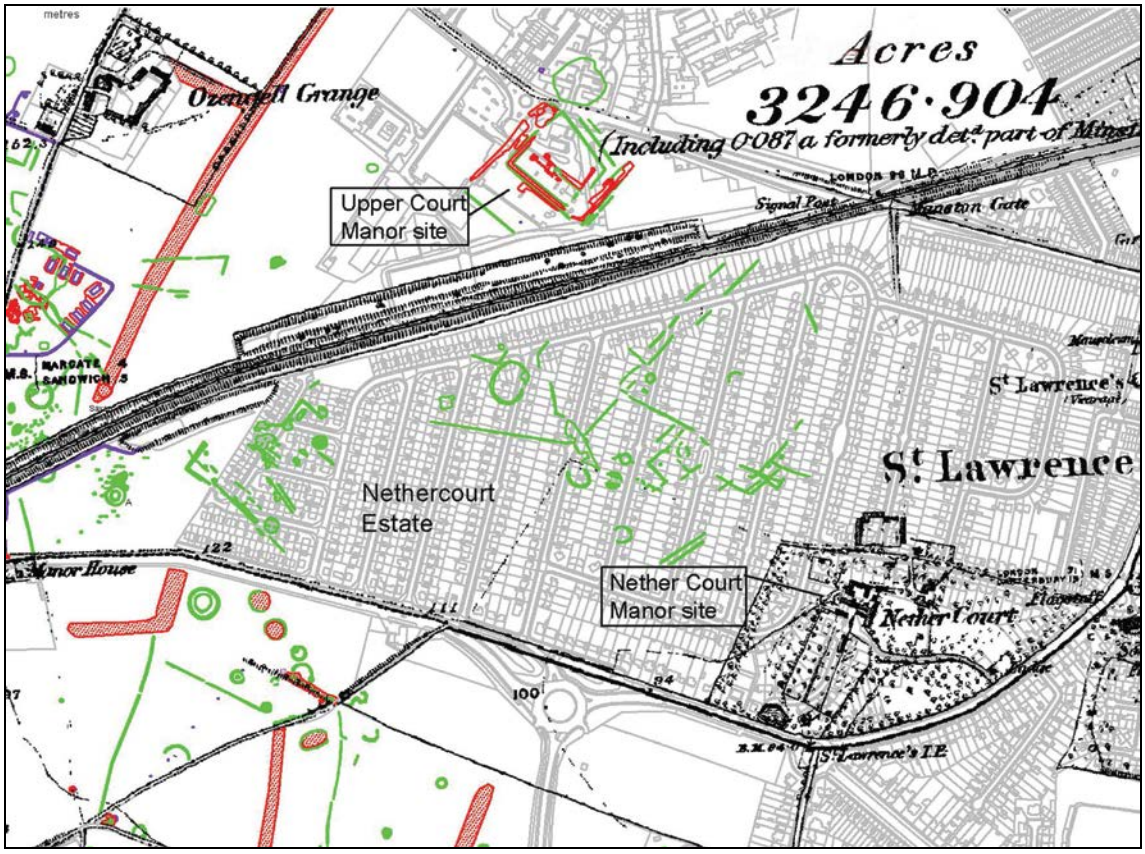


Figure 28: The sites of two adjacent medieval manors of Upper Court and Nether Court on the western edge of Ramsgate overlaid to the current OS Mastermap and the OS first edition map of 1877. Also depicted are the remains from multiple periods mapped from aerial photographs and lidar images in the immediate area. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100019088. © and database right Crown Copyright and Landmark Information Group Ltd (All rights reserved 2019) Licence numbers 000394 and TP0024

Westwood Cross

A wide range of archaeological features were uncovered during the construction of a 12.5km long underground wastewater pipeline traversing the Isle of Thanet from Weatherlees Wastewater Treatment Works to the Margate Headworks. Thirteen of the more significant sites identified along the route were excavated. One of these excavations was focused on the north-western side of two superimposed medieval rectangular enclosures on the southern side of Star Lane at circa TR 3596 6778 (Egging Dinwiddy and Schuster 2009, 134-5). Vertical aerial photographs taken in 1990 for Kent County Council (accessed through Google Earth: Fig 29) also show the faint cropmark remains of what appears to be a group of three large rectangular

ditched enclosures at this location, the most complete of which measures in the region of 37m by 39m (Fig 29). The north-western enclosure coincides with the partial remains of medieval enclosure ditches identified during the pipeline excavations, the two overlapping enclosures appearing as one blurred cropmark.

Figure 29: Above – Plan of cropmarks representing 13th-14th century medieval settlement enclosures off Star Lane. Mapping © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900. Below – Extract from Kent County Council aerial photograph accessed through Google Earth showing faint cropmarks of the enclosures prior to the development on Star Lane depicted on the OS map extract. The NW enclosure has been excavated and dated. © GOOGLE.EARTH.CPM 01-JAN-1990 ACCESSED 23-OCT-2019.

The pipeline cut also revealed further medieval features, including part of an enclosure and a medieval oven situated further along Star Lane, circa 70m to the north-east Powell 2011), though it is not clear if there is any relationship between

the two sites, and these further features were not visible as cropmarks. All three of these enclosures seen on the aerial photographs now lie beneath a housing estate.

Pegwell Bay fish weirs

There are slight traces of two probable early medieval or medieval V-shaped fish weirs in Pegwell Bay recorded from RAF aerial photographs taken at low tide on 22nd April 1950 (Fig 30). These are fish-proof barriers built in the inter-tidal zone from wattle hurdles and brushwood bundles, and held in place either by timber posts or a combination of posts and rubble. The 'V' pointed out to sea, trapping fish as the tide receded. The fish were channelled into a net or basket in the apex or 'eye' of the V. These kinds of traps were generally used to catch a range of fish and crustaceans, including cod, herring sprats and shrimp. This type of fish trap is known from many locations around the British Isles. The earliest weirs and traps known from England may date as far back as the Neolithic, although almost all recorded examples have been dated to either the early medieval or medieval periods (Historic England 2018c). Sea-level changes, erosion, and of course the difficulty in identifying such structures are among the possible reasons for the shortage of evidence for earlier examples. The two weirs seen in Pegwell Bay were located over 700m south-east of the beach at Cliffs End and measured approximately 140m by 105m (SW) and 140m by 85m (NE). The remains are visible on the aerial photographs as incised ditches or trenches in the mud, which have survived despite the scouring action of the tide, and presumably represent the eroded ditch or foundation trench of now lost structures

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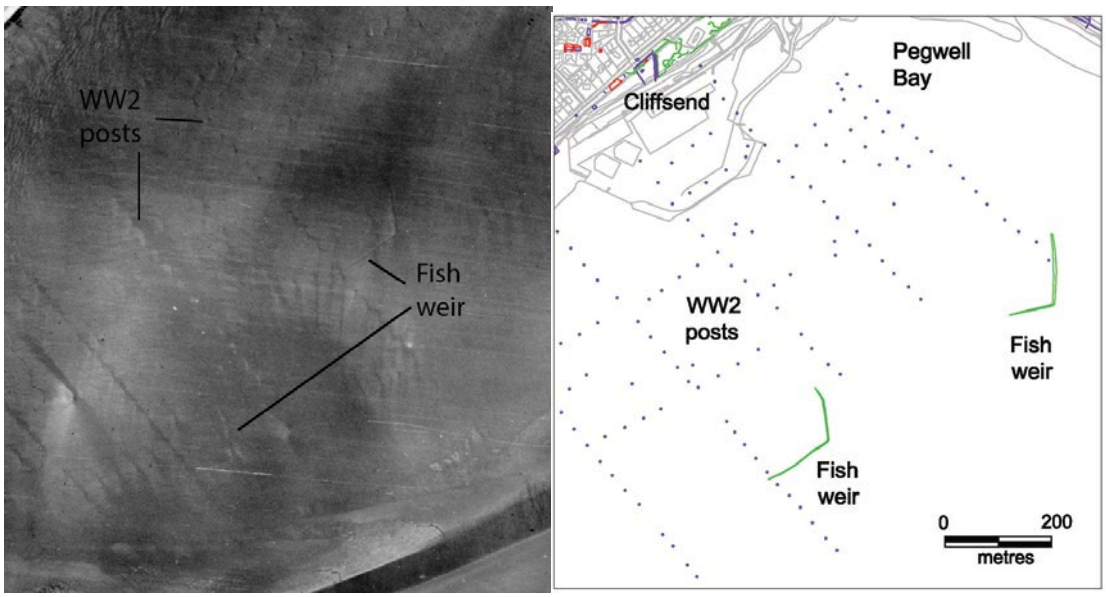


Figure 30: Left: extract from RAF/541/508/RP/3057 22-APR-1950 Historic England Archive (RAF Photography). Right: transcribed features showing the faint traces of two possible medieval fish weirs amongst the rows of posts thought to be Second World War anti-invasion structures. Mapping © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

Ramsgate through the Second World War

Immediately following the outbreak of the war, coastal defences were rapidly established along the entire south and south-east coast of England to counter an anticipated invasion. At Ramsgate, the beaches north of the harbour were blocked by scaffolding, and barbed wire entanglements were strung out along the seafront, the cliff-tops, and gaps in the cliffs. These defences were quickly followed by lines of concrete anti-tank cubes blocking routes off beaches and key roads, including the bottom of Madeira Walk and Harbour Street and The Royal Parade (Fig 31), as well as access to bridges and railway crossings outside the town. Numerous machine gun emplacements and brick pillboxes appeared along the coast and inland at strategic points (Humphreys 1997, 77).

By June 1940 a twin installation of 6-inch naval guns was in place opposite Wellington Crescent, and HAA (Heavy Anti-Aircraft) gun batteries were established around RAF Manston to the west (Humphreys 1997, 76). Some of the latter are visible on RAF aerial photographs taken between 1941 and 1946 – one at Chilton (Fig 39), and another at Cliffsend (Historic England Archive HLA/380/10RU 655 15-DEC-1941). A fourth HAA battery was established beside the sports ground at Dumpton (Fig 32). The Dumpton battery was established by June 22nd 1942, at which date it possessed four 3.7in guns (Dobinson 1996, 444). The Chilton site (listed by Dobinson 1996, 444 as 'Pegswell') is also first documented on June 22nd 1942, again with four 3.7in guns.

Figure 31: extract from 1942 RAF vertical photograph showing double rows of anti-tank cubes (left and right of centre of frame) across the Royal Parade and entrances to Madeira Walk and Harbour Street. RAF HLA/540/V/6094 17-MAY-1942 Historic England Archive (RAF Photography).

RAF aerial photographs taken in 1942 also show a large HAA battery to the south of Ozengell Grange (Fig 33). Furnished with four guns and seven huts or buildings, the battery was surrounded by substantial earthen blast walls within a triangular barbed wire enclosure. Aerial photographs record the changing configuration of this site through the war. Ozengell Grange appears to have been fortified with barbed wire, pillboxes and gun emplacements around the property. Dobinson (1996, 444)

notes that the earliest documentary reference that he found for the Ozengell HAA dates to June 22nd 1942, although the aerial photograph clearly shows a substantial presence by January of that year. The reason for the choice of Ozengell is not given. However, the presence of additional defences and their changing configuration indicates the farm was either fortified as a defensive node or perhaps served some other military purpose.

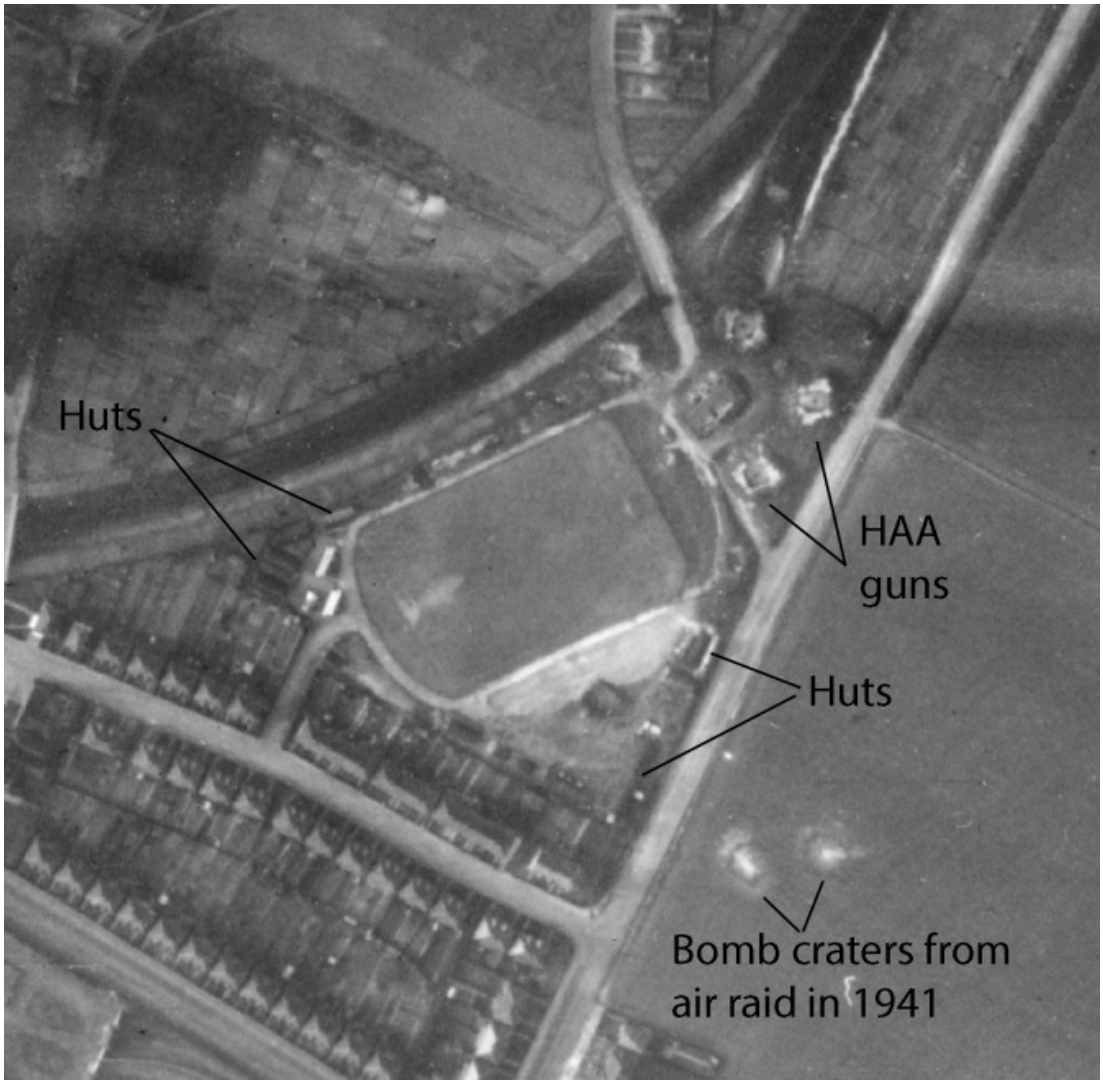


Figure 32: The HAA battery established around the sports ground at Dumpton. Wear around the goal and the presence of goalposts suggests that the football pitch remained in use during the war. Extract from RAF 1O6G/UK/1378/V/5069 04-APR-1946 Historic England Archive (RAF Photography).

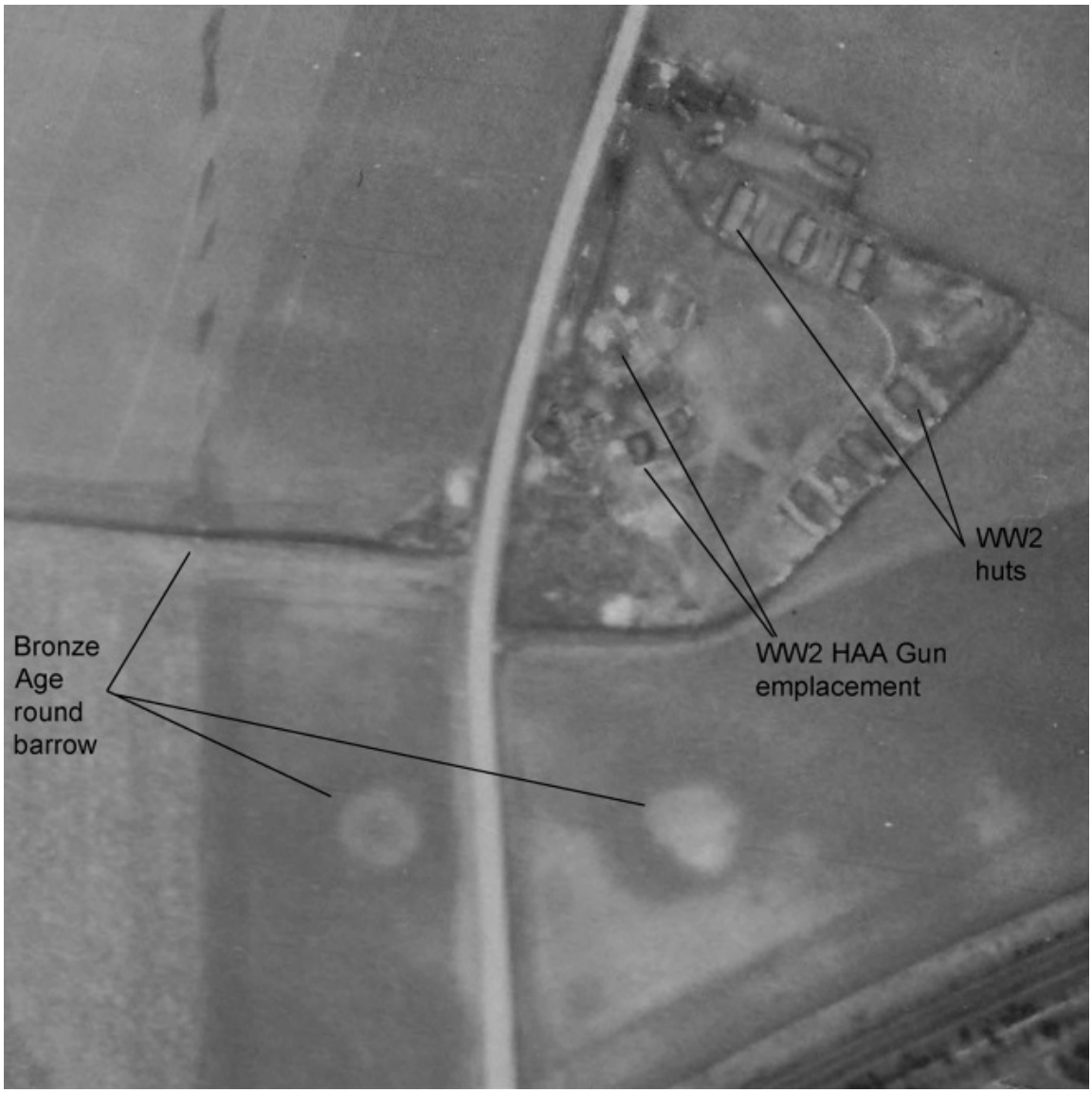


Figure 33:Extract from 1942 RAF vertical photographs showing a Heavy Anti-aircraft battery. Top is at Ozengell Grange with gun emplacements to the bottom left and a number of huts around the northern and eastern edges of the triangular compound. RAF/HLA/386/RS/912 02-JAN-1942. Historic England Archive (RAF Photography).

Inland from the initial coastal defences, further provision was made to impede progress of enemy troops and transportation in the event of a successful invasion. Strategic points such as road junctions, bridges and railway crossings, were controlled with concrete pillboxes, gun emplacements and road blocks. Where necessary, access to the railway was impeded by barbed wire and concrete cubes, and elsewhere cuttings and embankments themselves functioned as effective obstacles. At Lord of the Manor (Fig 34), two defended areas or nodes were protected by lines of barbed wire, road blocks, and gun emplacements on the bridges where both the Canterbury Road West (A299) and the Haine Road (A256) crossed the railway, heading west and north respectively. The road layout has since been altered with the construction of the East Kent Access Road.

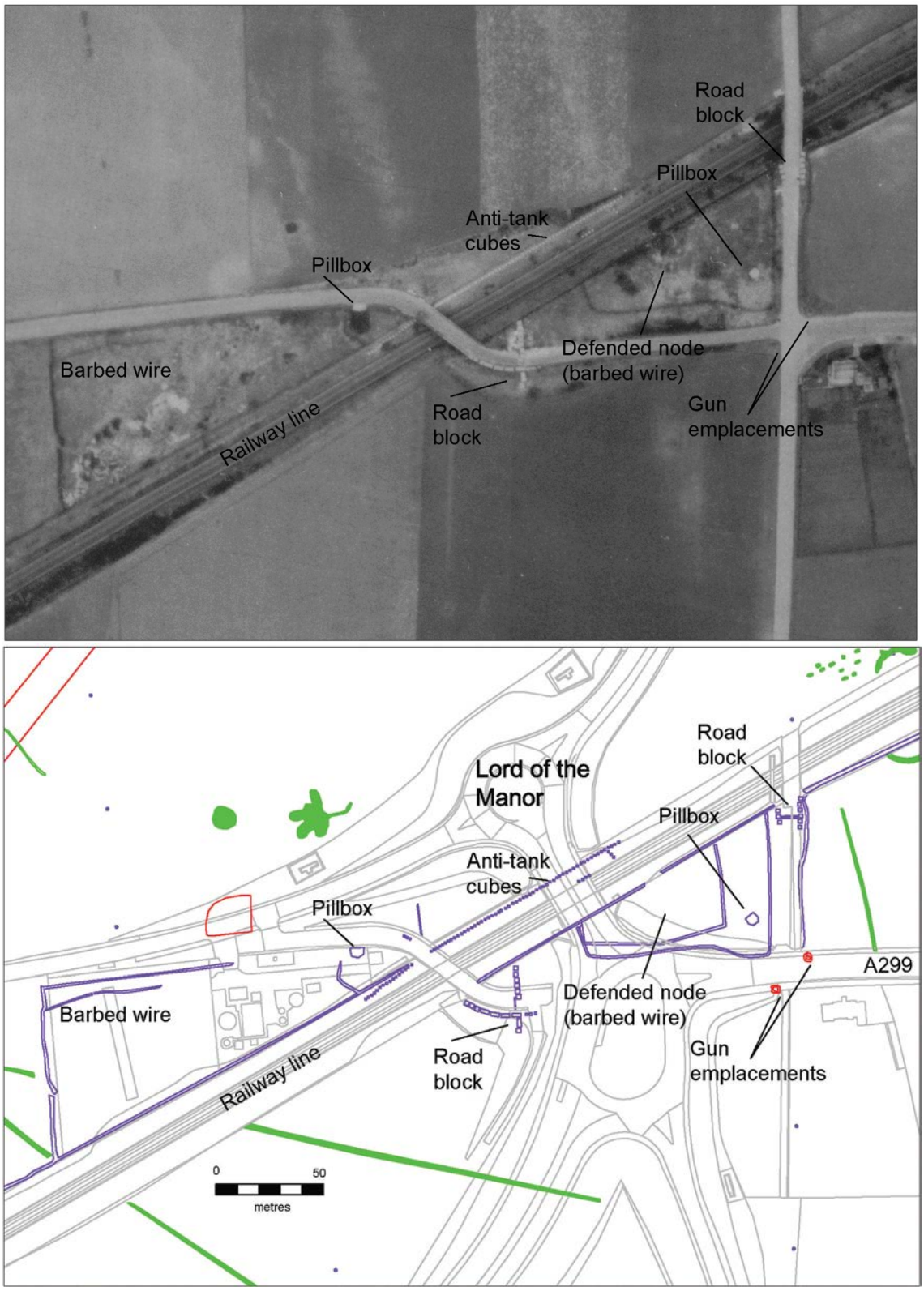


Figure 34: Second World War road blocks and defended nodes protecting the crossing points over the railway line at Lord of the Manor. Top: extract from RAF vertical RAF/HLA/386/RS/910 02-JAN-1942 Historic England Archive (RAF Photography). Bottom: mapping of the same area. Transcription © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

The harbour at Ramsgate had been a chief embarkation point during the Napoleonic wars, and played a similar role in the Dunkirk evacuation of 1940. During the Second World War the harbour underwent a number of superficial modifications as part of the anti-invasion defences (Figs 35-37; see also Fig 31). Gun emplacements and machine gun pillboxes were placed on the harbour piers and along the front and quayside. Access to the harbour was impeded with anti-tank blocks and rows of dragon's teeth and defended road blocks. The beach to the east of the East Pier was obstructed to prevent vehicular access from the sea. A line of scaffolding extended 500m north-east from the harbour wall to just beyond the access ramp from Marine Esplanade to the beach. The next stairway was also blocked with a large concrete block and further anti-tank cubes were placed in front of the railway station. Unexpectedly, there were no visible signs on aerial photographs of barrage balloons or their tethering points at Ramsgate, which is perhaps surprising considering the town's proximity to continental Europe and the constant threat from aerial bombardment.

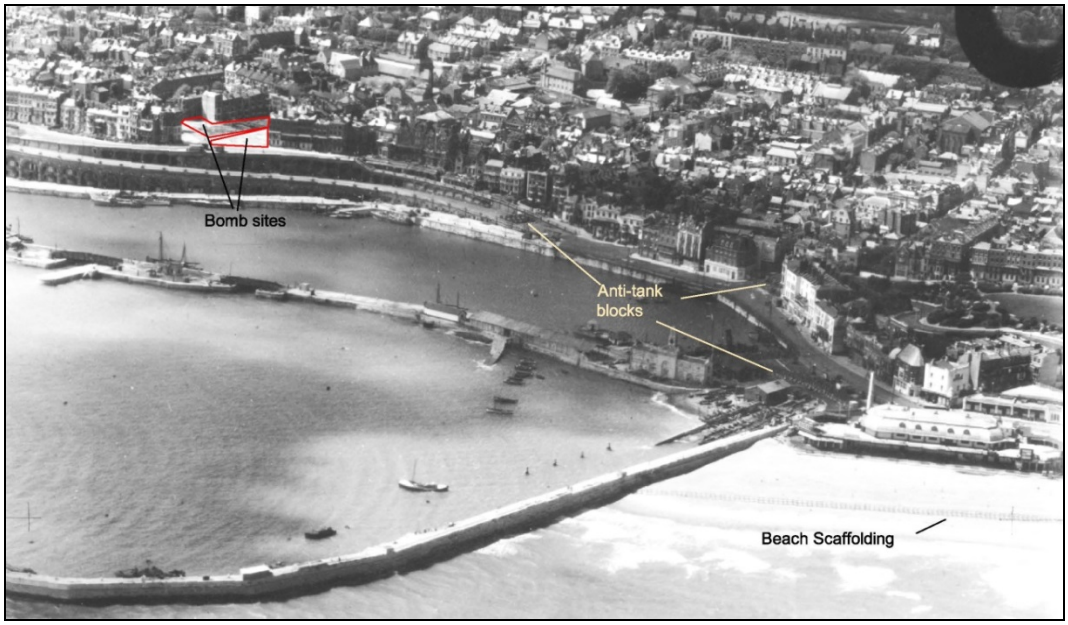


Figure 35: RAF military oblique aerial photograph of Ramsgate Harbour area taken in May 1942 showing some of the visible defences including anti-tank cubes on Royal Parade and Harbour Parade and bomb damage at the southern ends of Adelaide Gardens and Liverpool Lawn outlined in red. Extract from RAF HLA/547/P0/3006 30-MAY-1942 Historic England Archive (RAF Photography).

Aerial photographs taken at intervals from 1941 onwards (e.g. Fig 37) also show changes to the harbour structure and facilities, as well as some of the changes in its maritime use, for example with the post-war expansion of the use of leisure craft and by the construction of the ferry terminal. The aerial photographs also illustrate the ever-present problem of silting both within the harbour basin and against the exterior of the harbour walls, the silting being particularly evident at low tide.

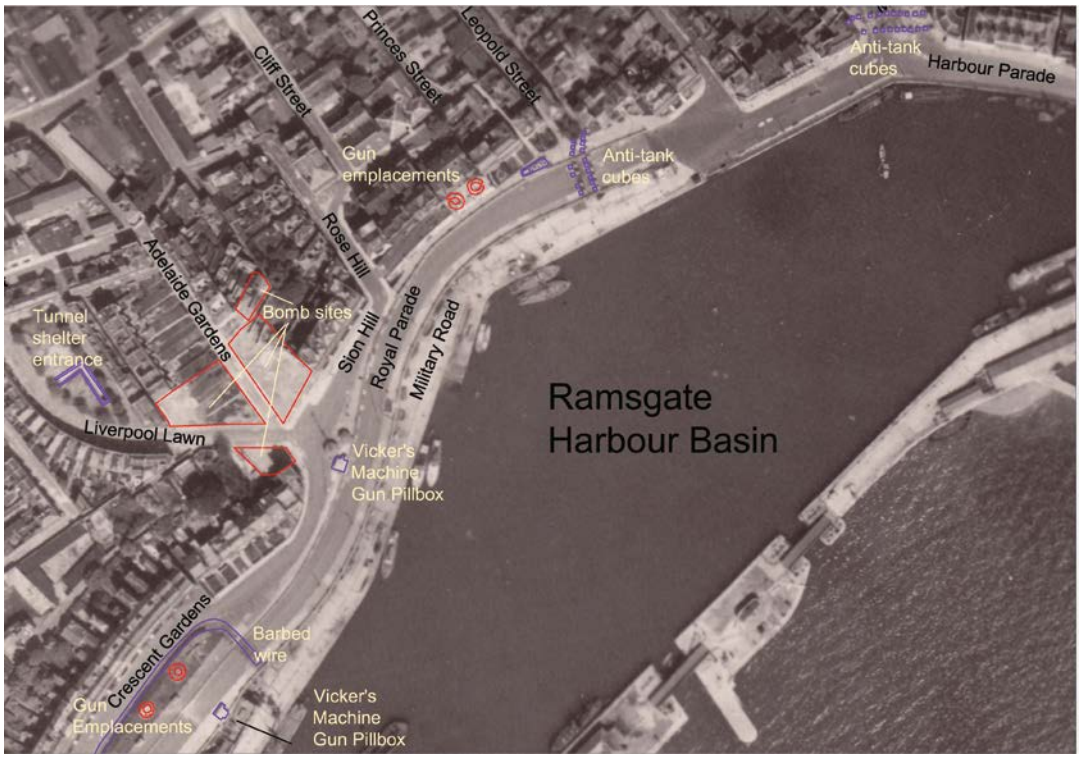


Figure 36: Ramsgate Harbour from the air on 17th May 1942 with the array of defences, plus areas of bomb damage outlined in red. Extract from RAF/HLA/540/V/6094 17-MAY-1942 Historic England Archive (RAF Photography).

Figure 37: A wider view of the harbour area showing anti-tank cubes and obstructions (seen as long dark lines) restricting access to and from the beach to the east of the harbour. RAF/HLA/540/V/6094 17-MAY-1942 Historic England Archive (RAF Photography).

Air raids and bomb damage

By October 1944 Ramsgate had endured 53 air attacks with at least 1073 bombs and 42 shells falling. As a result, 373 buildings were demolished and 340 homes and businesses had been severely damaged. Despite air raid shelters, 84 people had been killed and 262 injured. (Humphreys 1997, 80) Aerial photographs taken during the war clearly show the extent of damage from air-raids – for example, gaps in terraces, often with cleared building rubble, and bomb craters are visible across the town. Some bomb sites extend across a number properties.

RAF aerial photographs of Ramsgate taken in December 1941 (of which Fig 38 is just one) show areas of bomb damage (ringed on the original print, probably by contemporary RAF personnel). Rows of partially destroyed houses, business premises and the levelled sites of earlier bombing events are evident within and around the gas works and in the surrounding streets. There are two large rectangular emergency water supply tanks (EWS) on open ground off Hereson Road and in Boundary Park. EWS tanks in various forms were placed in urban areas to provide water for extinguishing fires in the event of failure of the mains during or following an air raid. They were generally placed at corners of streets and within industrial sites.

Figure 38: Extract from a 1941 RAF vertical showing cleared bomb sites around the gas works north of the centre of Ramsgate (seen here with its two circular gas-holders in the centre of the picture). The areas of bomb damage have been circled on the photographs in pencil. These areas of bomb clearance were later to be in-filled with prefab houses. RAF HLA/380/PORT/617 15-DEC-1941 Historic England Archive (RAF Photography).

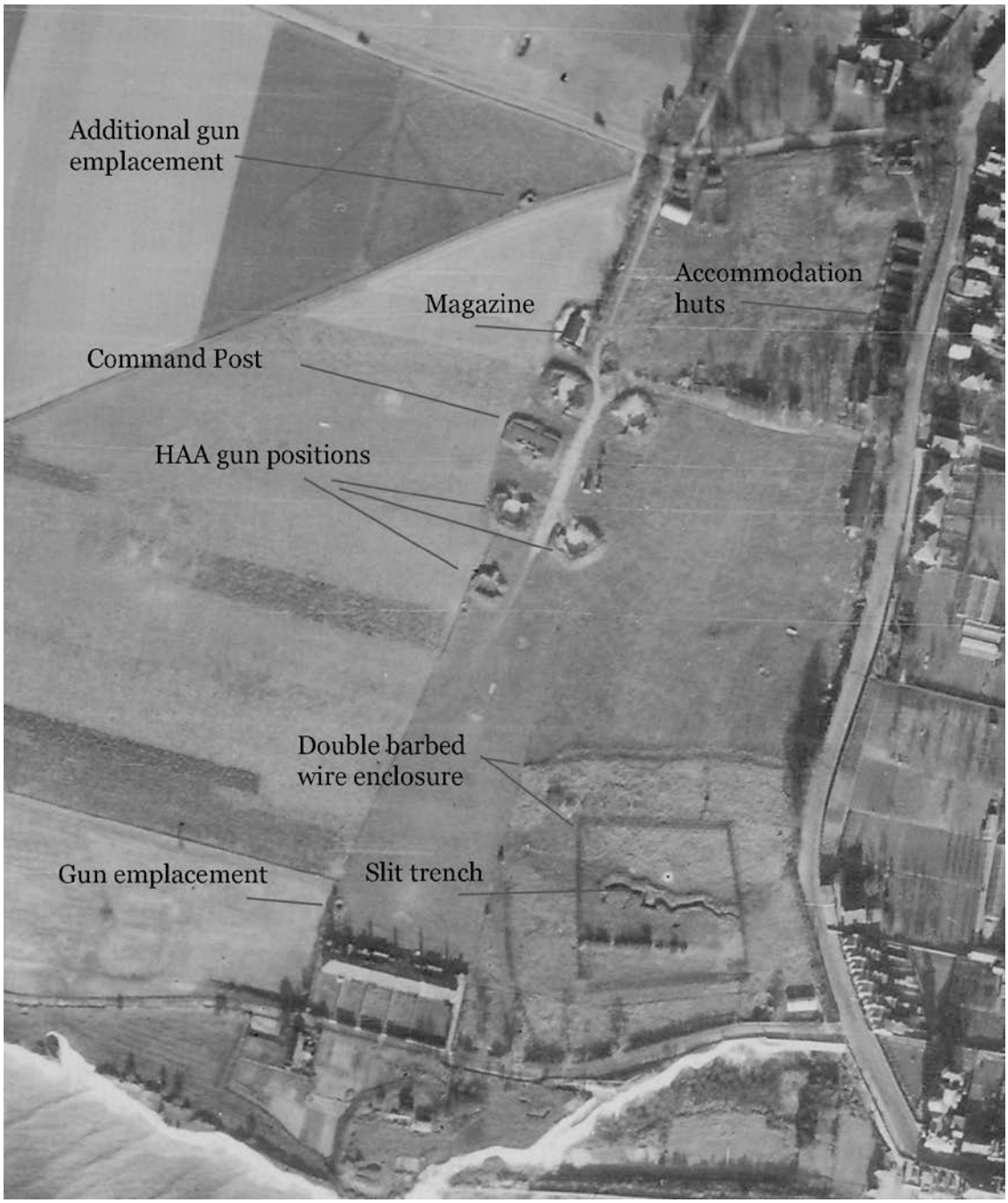


Figure 39: Second World War Heavy anti-aircraft artillery (HAA) emplacement at Chilton Farm, Pegwell, on the western edge of Ramsgate. The function of the installation within the double barbed wire enclosure is less clear. Extract from RAF/106G/UK/1131/RS/4002 17-Jan-1946 Historic England Archive (RAF Photography).

Radar

Developed before the war, radar was used to detect and plot the movements of aircraft and shipping by transmitting radio waves – the distance of the object from the radar station could be calculated by measuring the time taken for the waves to be reflected back. There were various types of radar station depending on geographical location and function. Chain Home Low (CHL) radar stations were, as

the name implies, part of a linear arrangement of stations that used a lower wavelength signal to detect lower-flying aircraft and shipping (Saunders and Smith 2001, 140). Chain Home Low stations typically comprised low buildings with a light 6m high wooden transmitter receiver gantry, or in later designs (Chain Home Extra Low) they could be mounted on a lorry or constructed as a dish mounted on a Nissen Hut, all of which would be hard to identify from the air (Lowry 1996, 42-45).

According to the gazetteer published by Dobinson (2000, chapter 6 and p167), a Chain Home Low installation at Ramsgate was originally part of a coastal defence chain known as the M-series (each station was given a number with the prefix 'M'). Ramsgate M6 was located at East Cliff on the eastern side of the town, initially focused on the potential threat of seaborne invasion. This site has not been identified on the available aerial photographs. However, two further possible sites, not listed by Dobinson, have been noted at West Cliff and Jackey Baker's recreation ground (for discussion of these previously unrecognised sites see http://www.kenthistoryforum.co.uk/index.php?topic=409.0).

Wartime aerial photographs show the site at Jackey Baker's recreation ground between Haine and Northwood to the west of Ramsgate (Fig 40). Several gun pits and a possible Bofors machine gun (casting a long shadow NW of the pavilion building) are located within a large barbed wire enclosure, though no trace of the radar receiver and transmitter can be seen. A possible candidate site for the CHL station cited at West Cliff is an installation seen in playing fields off London Road, Ramsgate comprising a group of huts set within a barbed wire enclosure protected by further gun emplacements (Fig 41).

Many military structures such as those described above were quickly removed after the war ended, and leave little or no visible trace today. However, RAF vertical photographs from 1941, 1942 and 1946 have captured some of this detail, recording otherwise elusive features. These photographs show the extent of Thanet's coastal and inland defences, including stop-lines and other defended locations or nodes. The lines of barbed wire entanglements extended along the coast and encircled strategic points, such as the anti-aircraft batteries at Pegwell, Cliffs End, and Lord of the Manor. Other more robust features were sometimes overlooked during the initial post-war dismantling programme. These typically include small buildings and structures made of concrete, such as pillboxes, which were more difficult to remove and were not causing an obstruction. Two concrete 4-inch gun emplacements at Little Cliffsend Farm Coastal Battery are among such survivors. Clearly visible on 1951 RAF photographs (Fig 42), they remained in use as a stable and sun room into the late 20th century at least (NRHE 1423881). Parts of the structures are still marked on current Ordnance Survey mapping.

Figure 40: Site of a possible Chain Home Low radar station located at Jackey Baker's recreation ground between Haine and Northwood to the west of Ramsgate. Several gun pits and a possible Bofors machine gun (casting a long shadow NW of the pavilion building) can be seen within a barbed wire enclosure. Extract from RAF/HLA/380/PORT/655 15-DEC-1941 Historic England Archive (RAF Photography).

Figure 41: Possible site of the Chain Home Low radar station at West Cliff seen in playing fields off London Road (just above the centre of the frame), comprising several huts or buildings within a barbed wire enclosure. Extract from RAF/106G/UK/1131/RS/4001 17-JAN-1946 Historic England Archive (RAF Photography).

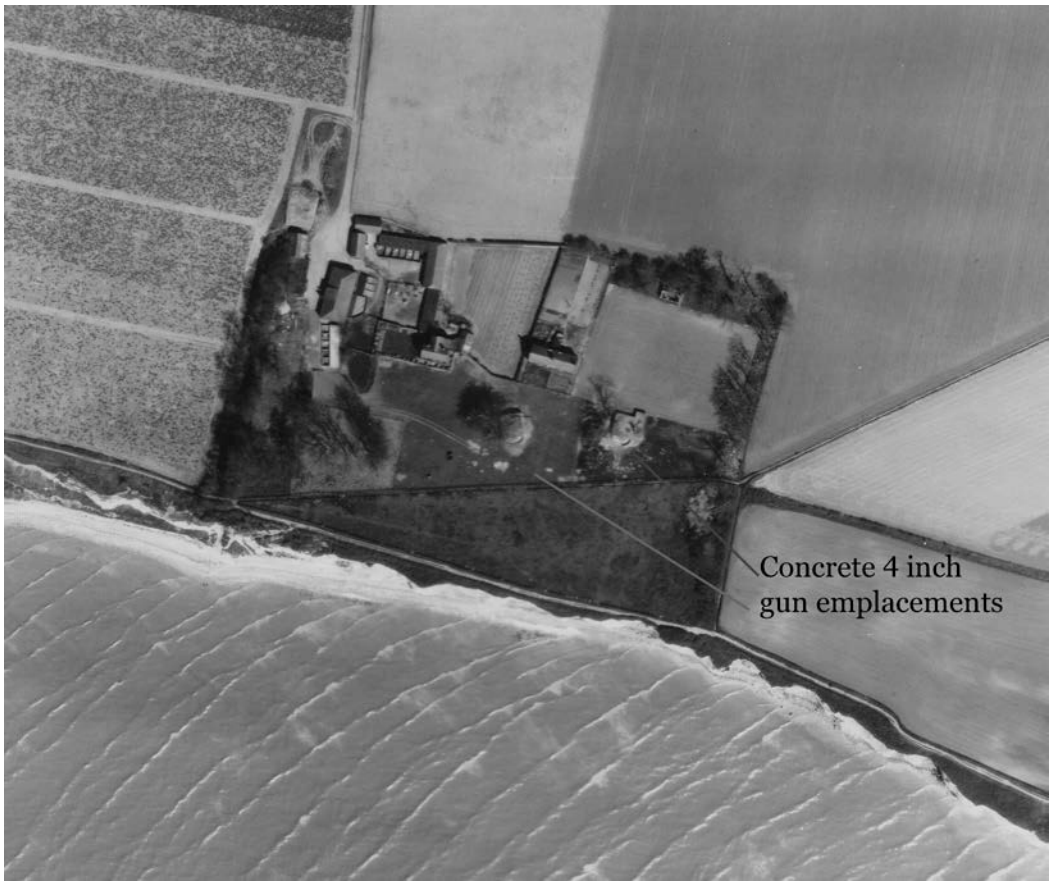


Figure 42: Second World War coastal battery with two concrete reinforced gun emplacements that had previously held 4-inch guns at Little Cliffsend Farm, west of Ramsgate and overlooking Pegwell Bay. Extract from RAF/58/646/VP3/5008 22-Apr-1951 Historic England Archive (RAF Photography).

Anti-invasion defences

With constant threat of aerial and maritime invasion, measures were also taken to prevent aircraft from landing in open areas. Methods varied around the country, from cut trenches with piles of up-cast material dotted on either side to networks of posts and wires, or simply areas of spaced posts designed to impede landing and break a plane's landing gear. RAF aerial photographs taken in December 1941 show extensive alignments of posts laid out in grids throughout fields to the west and north-west of Ramsgate (Figs 43, 44). These posts are difficult to identify on vertical aerial photographs, and were chiefly recognised from the shadows they cast. It is not clear how deeply these posts were driven into the ground, but it is possible that some may have been encountered amongst the spread of cut features in archaeological excavations around Ramsgate.

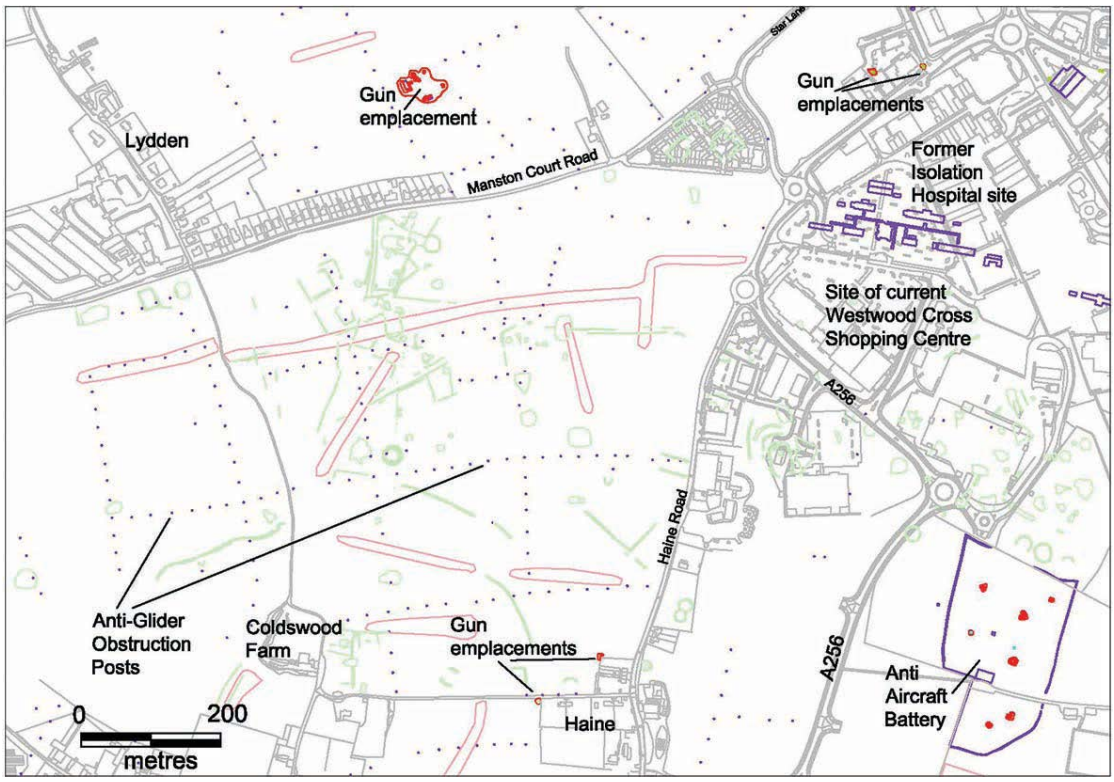


Figure 43: Mapping illustrating the extensive layout of posts thought to be Second World War anti-aircraft obstructions north-west of Ramsgate. Other military features are also highlighted. © Historic England; base map © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

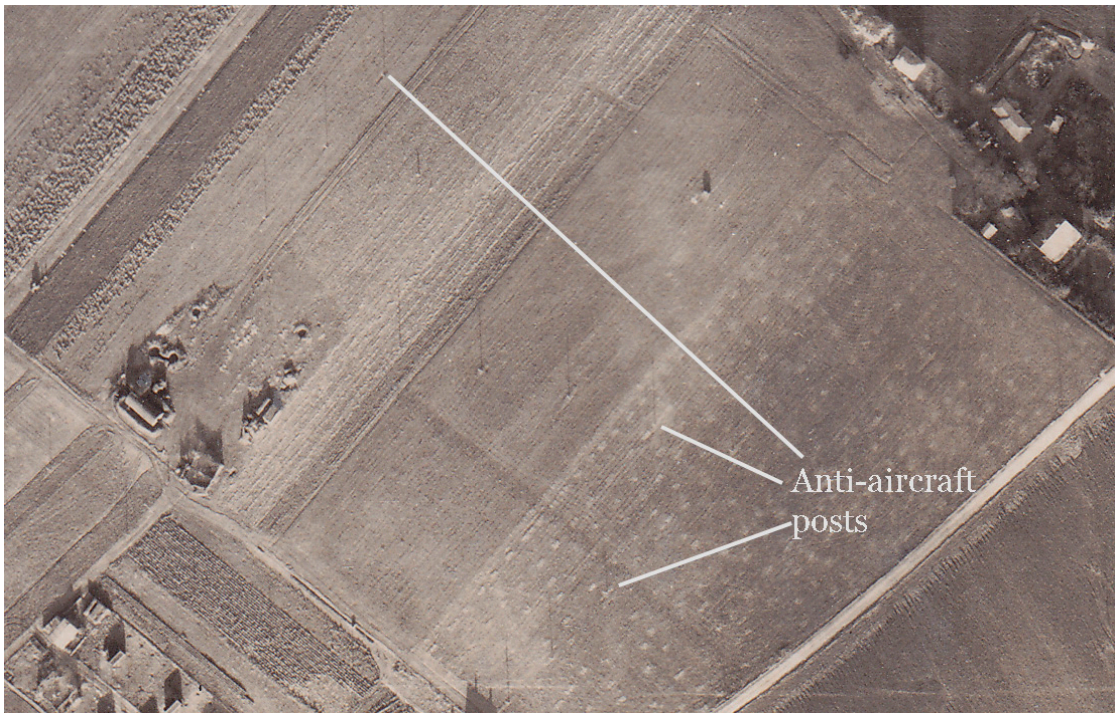


Figure 44: Extract from 1941 RAF photograph showing lines of anti-glider posts north of Manston Court Road, Lydden, each casting a long thin shadow extending north of the base of each post. There is a gun emplacement with gun pits and buildings to the left of the posts. RAF/HLA/380/STBD/960 15-DEC-1941 Historic England Archive (RAF Photography).

In Pegwell Bay, on the mud flats exposed at low tide, a similar system of posts are thought to be another element of the anti-invasion obstructions (Fig 45), possibly designed to impede access to boats and prevent landing craft from progressing across the expanse of mud to the beach at low tide. They may also have been intended to prevent aircraft, such as gliders, landing on the extensive mud flats. These posts were also laid out in a grid of linear alignments, recorded on RAF aerial photographs taken in May 1942 (e.g. Fig 46).The depressions left by the posts can still be seen in the mud on aerial photographs taken eight years later (see Fig 30). The absence of photographs earlier than May 1942 means it is at present impossible to say when the posts were installed, while the state of the tide and the scale of subsequent sets of aerial photographs means that it is not possible to say how long they remained in situ. In addition, it is also unclear from the available photographs whether or not wire was slung between each post for added obstruction.

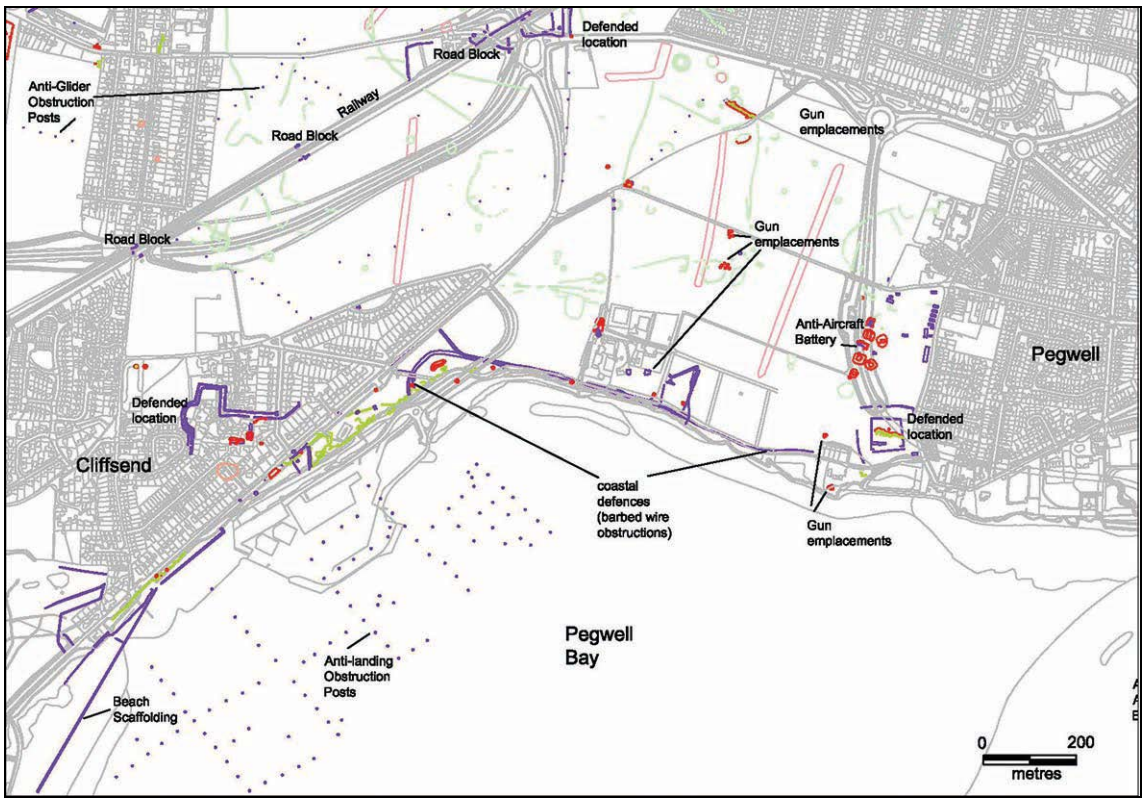


Figure 45: Second World War beach and coastal defences at Pegwell Bay mapped from RAF aerial photographs taken in 1941 and 1942. © Historic England; © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

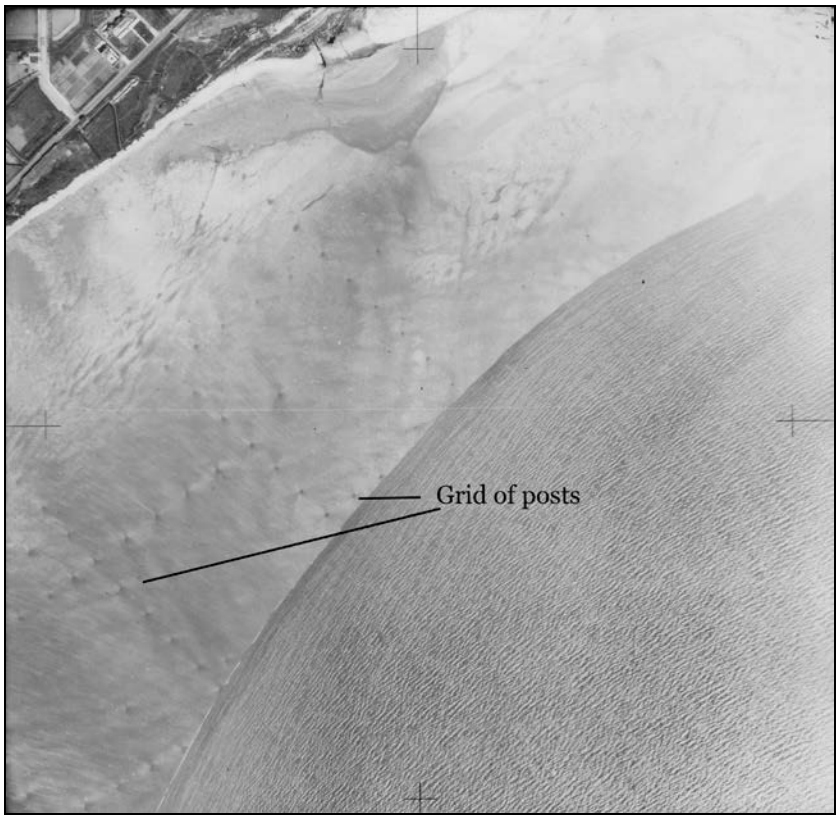


Figure 46: Second World War anti-invasion defences on the mud flats of Pegwell Bay made up of an extensive grid of posts or stakes exposed at low tide. Extract from RAF/HLA/540/V/6053 17-MAY-1942 Historic England Archive (RAF Photography).

Wartime tunnels and shelters

Ramsgate's proximity to continental Europe, highlighted by the damage suffered during the First World War, prompted plans to protect the town's population as the threat of further conflict grew during the 1930s. By 1936 the first plans for a tunnel network in the chalk beneath the town were already being discussed. However, the scheme was rejected by the Council who considered it too expensive. Two separate submissions to Government – one following the occupation of Austria in 1938 and the second after the Munich Crisis in September 1939 – were also rejected (Spain 2011). In the meantime an existing railway tunnel leading from the sea front to Hereson Road, the Granville Hotel Tunnel, and further tunnels belonging to St Augustine's Abbey (known as the Pugin Caves) were being prepared as shelters, and a public entrance to the system was dug from the latter cave system to the recreation ground opposite. A further application to develop an underground tunnel network was made in February 1939 and agreed to by Government in March (Spain 2011).

The tunnel network followed the line of existing roads at an average depth of 70 feet. Chalk spoil was deposited at the foreshore between the West Pier and the Western Undercliff Promenade, with the intention of extending the promenade at some point in the future (Spain 2011). The resulting tunnel network proved a success, providing protection to the population of Ramsgate as a succession of heavy air raids damaged and destroyed homes and premises above. For example,

after a single night of heavy bombing on 24th August 1940, 78 homes were destroyed, with over a thousand others damaged, leaving 31 dead, 58 injured and around 300 families homeless (Stockman 1986, 40-41). As a result, some people began to live in the tunnels on an almost permanent basis.

Figure 47: The Second World War public air raid shelter tunnel entrance visible as an L-shaped access in Liverpool Lawn Gardens, Ramsgate in May 1942. This was later in-filled and capped, and is now invisible beneath the grass. Extract from RAF/HLA/540/V/6094 17-MAY-1942 Historic England Archive (RAF Photography).

To a certain extent, the existence of the tunnel network negated the need for the kind of large surface public air raid shelters seen in the streets and parks of other towns and cities across the country. The public entrance to the tunnels was via stairways similar to London Underground entrances. These were generally sited in parks, public areas and school grounds. Many of these can be seen across the town on RAF aerial photographs taken during and immediately after the war (Fig 47). Following the end of the war, the tunnels were abandoned and all the entry points were in-filled and sealed, leaving little evidence on the surface. Those in public parks were grassed over. However, post-war aerial photographs have revealed the outlines of some of the in-filled entrances where the concrete capping slab is visible or lies just below the turf in parks, sometimes causing parching of the grass in summer.

The tunnels themselves remain largely intact below ground and have recently been developed into a visitor attraction, with guided tours entering the old railway tunnel off the Marine Esplanade (www.ramsgatetunnels.org). On the northern edge of the town, beyond the extent of the tunnels, more conventional means of air raid protection were employed. A few covered trench shelters or semi-sunken Stanton shelters were built, including four in the grounds of St Lawrence College visible on wartime RAF photographs (Fig 48). Stanton shelters were constructed from pre-cast steel-reinforced concrete segments, usually partly sunken or buried. Other sites were provided with open slit trenches for emergency protection in the case of an air raid.

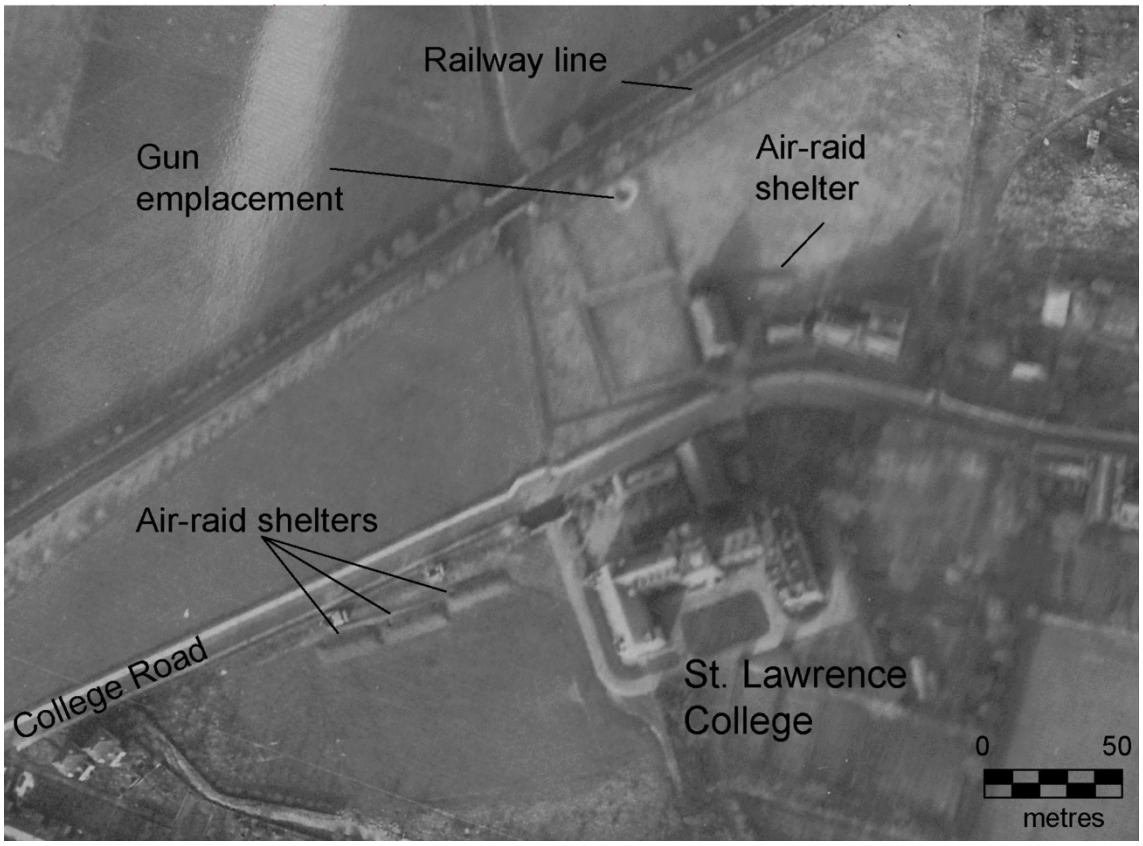


Figure 48: Extract from an RAF aerial photograph showing air-raid shelters at St Lawrence College in 1941 which lay beyond the reach of the tunnel network. These were either covered trench shelters or semi-sunken Stanton shelters. RAF HLA/380/STBD/921 15-DEC-1941 Historic England Archive (RAF Photography).

Post-war Prefab housing

Following the First World War, there had been a drive to improve both the quality and quantity of social housing, leading to the Housing Act of 1919. Half a million new houses were planned, but only 213,000 were built before funding was cut due to the weakening economy in the early 1920s. However, the provision of housing had become a national responsibility. Under the terms of the Housing Act of 1930, local councils were expected to clear slums and, in the inner cities, to provide subsidised housing for the poor. The various inter-war housing acts led to 1.1 million houses being built, but this was still short of the intended goal, and of course house building ground to a halt at the onset of war. The housing crisis escalated through the war, and by November 1942 alternative solutions to the problem were being investigated. Prefabricated housing being developed in the USA was seen as the solution (Blanchet 2014). In May1943 Churchill announced his Temporary Housing Programme, and the Government opted for a prototype temporary steel bungalow known as the 'Portal Bungalow' after Lord Wyndham Portal, who was at the time the First Commissioner of Works and Public Buildings (Gilbert 2011). The first prototype was ready by May 1944: a flat-roofed rectangular building with two bedrooms, a living room, and a basic fitted kitchen with fridge and gas cooker, and a coal fire with a back boiler to provide heat and hot water. Each had an indoor toilet and bathroom, a luxury to most people who were used to outside toilets and tin

baths, and still a luxury to a third of the British population even in 1951 (Gilbert 2011, Blanchet 2014). In addition to the Portal Bungalow, a number of other designs were investigated from other countries, and eleven different types were adopted in different parts of the country (Blanchet 2014, 14). All prefabs had a front and rear garden and a garden shed. In some instances these sheds were re-used Anderson shelters (Gilbert 2011).

By spring 1944 the pressing problem caused by the sheer scale of housing loss and damage, and the prospect of returning troops, also led to a renewed focus on repairing and reconditioning damaged homes, and providing emergency homes as a stop-gap whilst new houses were built (Blanchet 2014, 5). Prefab production and house building also provided employment for the returning troops, the unemployed, and for prisoners of war (Blanchet 2014, 12).

Ramsgate had suffered terribly from constant air raids throughout the war, and by the end of hostilities there was an urgent need to rapidly provide homes to accommodate both displaced residents and returning troops and evacuees. A request for emergency housing by Ramsgate Town Council secured an order of 150 Uni-Seco type prefabs (Fig 49) for Ramsgate, the majority of which were to be built in open land on the edges of existing developments to the north of the town.

The first two prefabs arrived on 4th January 1946, with more following in pairs at a rate of 20 per month. The first house was erected in Clements Road, as reported in the Thanet Advertiser on Tuesday 22nd January 1946 (p3):

Prefabs of the Holls Uni-Seco type will provide plenty of room for their occupants. In each house there are two bedrooms, a good-sized living-room, kitchen, bathroom and separate lavatory. A feature of the kitchen, which will be entirely up-to-date, is a built-in refrigerator. The cost of each pre-fabricated house, including its erection, but excluding the substantial items of sewers, roads, etc., is £1,020. Provided by the Ministry of Health through Ramsgate Corporation, they will be let to the families in most urgent need of accommodation and the rent— 10s. plus rates - will be somewhere in the region of 15s. inclusive. Seventy-four temporary houses will spring up on the Clements Road estate and, when they are completed, another 76 are to be built on land off Newington Road. Sites scattered over the town now bring the total up to about 150. Government Expense While it is necessary that temporary houses must be built to tide us over until large estates of permanent buildings are ready; it will be observed that the cost of a pre-fab approaches that of a permanent Council house, which will cost about £1,200. The expenditure on the temporary houses, however, is being borne by the Government. "The housing programme is going very smoothly," said the Borough Surveyor (Mr. R. D. Brimmell) to our representative. "This year we shall break the back of our urgent needs."

On the same page another article announced a programme of construction being carried out on the first of 700 new houses in Ramsgate, including the 150 prefabs as well as the beginning of a permanent housing estate at Newington, with the erection of the first 33 new houses to be followed by further blocks of housing over the year.

Elsewhere in the country, prefabs were generally placed on prepared foundations and roads of existing pre-war housing developments which had been stalled at the onset of war. The intention was to remove the prefabs as the permanent houses were built around them (Carpenter 2018). The first photographs of the construction of the Newington estate. Ramsgate show the skeleton of the road layout and trenches for the services, but whether these were pre-war foundations for a halted development or newly laid for the prefab housing is not clear.

Figure 49: A rare surviving Uni-Seco type prefab on the Excalibur Estate, Catford. This is the same type ordered for Ramsgate. Historic England Archive DP167487, 29 July 2014. Photograph by James O Davies, © Historic England.

Aerial photographs taken in April 1946 (Fig 50) show the progress of prefab construction at Clements Road. By this time, 45 of the final 75 prefab units (one more than the total originally suggested in the Thanet Advertiser article quoted above) appear in place in the northern half of the estate, whilst the prepared foundations of the remaining units can be seen in the southern third of the estate. Meanwhile, at the site of the Newington estate, the layout has been prepared and excavations for the services started. It is not clear from the photographic evidence if

this site was provided specifically for the prefab estates, or was already laid out prior to the war for a housing development halted by the outbreak of hostilities.

Figure 50: Extract from a 1946 RAF vertical showing the Clements Road prefab estate under construction and the roads for the Newington estate. Also note the extensive allotments between the houses of Whitehall. RAF 106G/UK/1378/V/5072 04-APR-1946 Historic England Archive (RAF Photography).

By August 1947, when photographed by Aerofilms (Historic England Archive: AFL 194070812 EAW00932), the prefab estate at Newington was complete with a total of 76 prefab units (see also Fig 51). It appears fully occupied with established and well-tended vegetable gardens – a reminder of the on-going post-war rationing of food. Across Stirling Way, to the north of the estate, is a large field of allotments, one of the many seen in and around the town during and after the war. The same 1947 photograph also shows the adjacent estate of standard semi-detached houses in the process of being built. The latter were being constructed on the remaining prepared road outline seen on the 1946 photographs, demonstrating that the prefabs were an emergency insertion into a planned permanent housing development.

Aerial photographs show a further 23 prefab units placed on bomb sites within Ramsgate. These are in addition to the two planned estates of prefabs at St Clements Road and Newington, which between them accounted for the 150 prefab units requested plus an extra unit at St. Clements Road (Fig 52). The 23 prefabs are located around the gas works on Sussex Street, as well as in Denmark Street,

Finsbury Road, and Alma Road to the west of Boundary Park. These bomb sites were requisitioned by the Borough of Ramsgate for the construction of housing in November 1947 (Thanet Advertiser 11 November 1947, page 1).

Figure 51: Extract from a 1951 RAF vertical showing the Newington prefab estate off Stirling Way. RAF/58/688/VP2/5167 23-MAY-1951 Historic England Archive (RAF Photography).

Figure 52: Extract from a 1950 RAF vertical showing the infill (highlighted) prefab housing on former bomb sites around the gas works in Sussex Street, Denmark Street, Finsbury Road and Alma Road. RAF 541/484/RS/3002 07-APR-1950 Historic England Archive (RAF Photography).

The Clements Road and Newington prefab estates can still be seen on aerial photographs taken in December 1960, but later photographs show that by July 1972, the Newington estate prefabs had been removed and replaced by two-storey blocks of council maisonettes. Aerial photographs also show that by April 1975, the Clements Road estate was being demolished in advance of a similar development of flats (Fig 53). Elsewhere in the town, four of the prefabs immediately adjacent to the gasworks on Denmark Street had been removed, but those at the southern end of the road still remained in 1975. The block of five prefabs on Sussex Street to the south-east had already been cleared by this date as part of a larger area being prepared for redevelopment.

Figure 53: Extract from a 1975 Ordnance Survey vertical showing demolition of Clements Road prefab estate in progress (right) and Newington estate already replaced with blocks of maisonette flats (left). OS 75020/036 22-APR-1975 Historic England Archive (Ordnance Survey photography).

Ramsgate Airport

On the northern edge of Ramsgate (at TR 3765 6735), to the north-east of Northwood, a civil airfield with a grass runway opened in1935 (Fig 54). The airfield was operated by a company owned by millionaire racing motorist Whitney Straight, who commissioned the architect D Pleydelle-Bouverie to design an art-deco terminal building and club house for the airfield (Fig 55). Plans for the building were reported in the local paper: 'The architect has designed an attractive building with a long, flat concrete roof, narrowing at each end like the wings of an aeroplane and surmounted with a look-out tower after the fashion of a pilot's cabin' (Thanet Advertiser, Friday 4th October 1935, page 2).

In July 1937 it was opened officially as Ramsgate Airport, offering flights to a number of airports in England and across the Channel (Thanet Advertiser Friday

09 July 1937, page 9). Between 1937 and the outbreak of the war it hosted week-long aviation camps in 1937, 1938 and 1939 offering pilot training to obtain aviation licences. It also hosted the Thanet Air Race on the 21st August 1937, which was attended by 19 aircraft including two German and one Latvian plane (Thanet Advertiser Tuesday 10 August, page 5).

At the start of the Second World War, the airport was closed to civil aircraft, and was briefly used in 1940 during the Battle of Britain as a satellite of RAF Manston, following which it was disabled with obstructions for the remainder of the war to prevent enemy landings (http://www.ukairfieldguide.net/airfields/Ramsgate-Airport). Although no aerial photographs were available of the site when it was briefly used by the RAF in 1940, photographs from April 1946 show the remains of a couple of slit trenches and a gun emplacement around the edges of the airfield (e.g. Fig 56) but no significant defences, possibly due to the short period of use during the war and subsequent mothballing of the airfield until after the war was over.

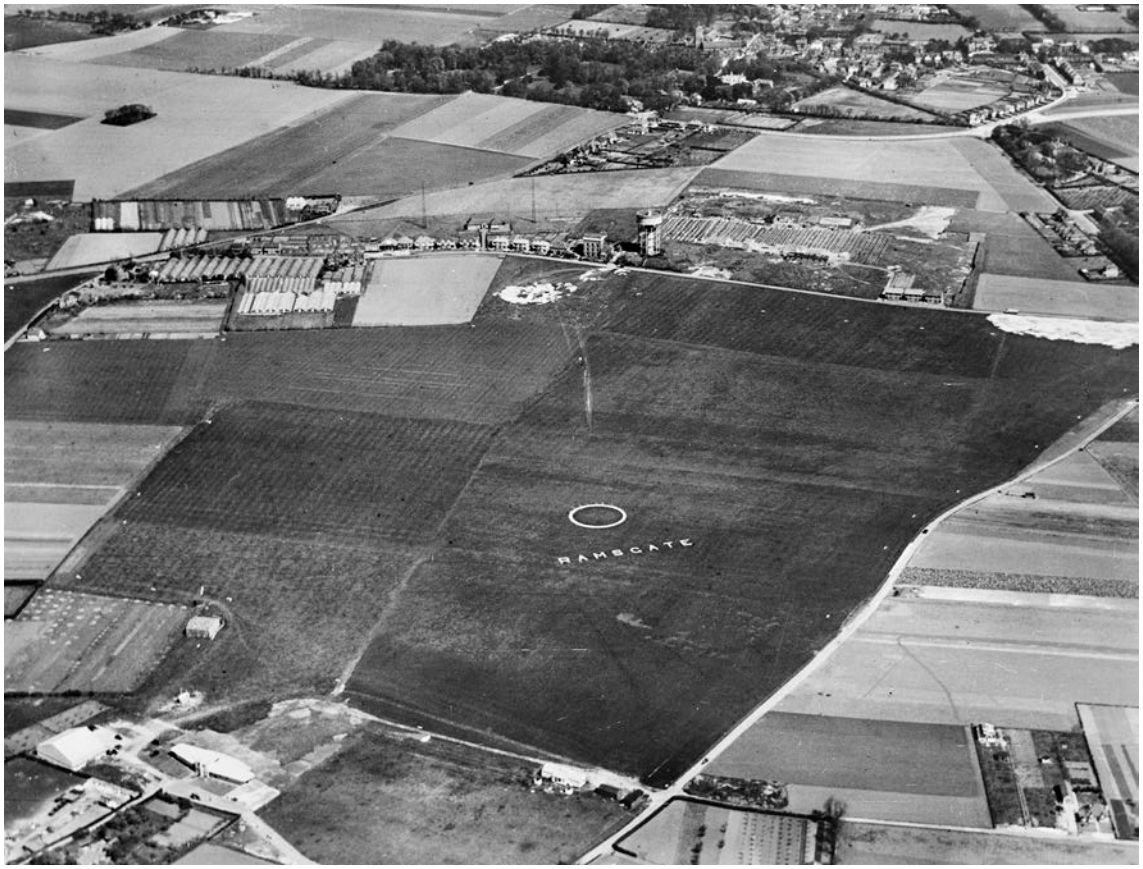


Figure 54: Ramsgate Airport in April 1937 with its new wing-shaped art-deco terminal building and club house (designed by Pleydelle-Bouverie), bottom left of frame. The airfield name and target circle are clearly marked on the landing field. HEA TR3767/0017 EPW052882 24-APR-1937 © Historic England Archive (Aerofilms Collection).

The airfield featured two grass runways, with landing and take-off possible in two directions: NE-SW and NW-SE. These runways occupied an open grassed area of approximately 780m by 615m. The main aircraft buildings, including hangars and the terminal building, were located at the south-western end Figs 54-55). The

landing ground featured a white painted circle 28m in diameter (at TR 3755 6731) with the name RAMSGATE painted beneath it in large, 8m-long letters (Fig 54). By 1946, these were only faintly visible on aerial photographs.

Following the war the airfield re-opened, operating as a civil airport, with a succession of aviation companies as well as a variety of aviation engineering and maintenance companies occupying some of the hangars until its closure in 1968. The art-deco terminal building, which had survived the war and post-war developments on the site, was finally demolished in the 1980s to make way for re-development of the airfield site.
(http://www.ukairfieldguide.net/airfields/Ramsgate-Airport).

Figure 55: Ramsgate Airport's art-deco styled terminal building topped by a wing-shaped blade of concrete designed by Mr D Pleydell-Bouverie, HEA TR3767/0015 EPW053975 JUN-1937 © Historic England Archive (Aerofilms Collection).

The site is now occupied by Pysons Road Industrial Park, but Google Earth aerial photographs dated to April 2017 show the main airport hangar, which lay to the north-west of the terminal building, still remaining in commercial use just off Hopes Lane (GOOGLE.EARTH.CPM 09-APR-2017 ACCESSED 23-OCT-2019).

Figure 56: Ramsgate Airfield in 1946. The white circle and the name 'RAMSGATE' are faded but still visible. The wing-shaped roof of the terminal building is clearly visible to the left of centre. Extract from RAF 106G/UK/1378/V/5071 04-APR-1946 Historic England Archive (RAF Photography).

CONCLUSIONS

This survey has demonstrated that, despite the amount of work undertaken in this corner of Kent in recent times, including previous aerial survey projects (RCHME 1989; Hamel and Lambert 2011) as well as large-scale excavation projects necessitated particularly by key and substantial infrastructure projects, there was a considerable quantity of sites awaiting discovery – 337 new site records were added to the NRHE database for a survey area that measured just 20km², much of that area covered by the current town.

However, despite the number of new sites, it is essential to highlight the need for ongoing reconnaissance as well as the use of additional, complementary techniques for investigating the archaeology of the project area. The relationship between the occurrence of cropmarks and the nature of the soils and geology has been highlighted. In the more open, arable areas this is something that can be addressed partly by the timing of future reconnaissance flights, should ideal conditions occur, but in essence it is important to recognise that a gap in the distribution of cropmarks does not mean a real gap in the presence and distribution of sites. Likewise, it is generally the more substantial features that are most likely to promote the appearance of cropmarks – there are likely to be many features surviving below the surface that have not impacted on the growth of vegetation above them. These are, of course, areas were appropriate methods of geophysical survey can complement the picture derived from airborne remote sensing.

In contrast to ground conditions, Ramsgate's administrative boundaries are largely irrelevant to the pattern of activity in the prehistoric and Roman periods (and perhaps to a certain extent on into the medieval period too). However, as Jonathan Last (2019) has pointed out in his discussion of the area's prehistory, our knowledge of the past has been, and continues to be, heavily dependent on the development and expansion of Ramsgate, including patterns of recent and current land use outside the built-up area. The establishment and growth of Ramsgate itself has left us with a highly fragmented picture of earlier periods across the project area, although discoveries such as the Neolithic causewayed enclosure at Court Stairs highlights the potential for future significant discovery within the town's boundaries through the use of archaeological interventions within the planning process.

The evidence from the fringes of the town, where aerial photographs were taken before development associated with Ramsgate's expansion, give an indication of what we may be missing. A good example is the Nethercourt estate, where cropmarks photographed while house-building was already underway show that the dense spread of sites surviving beneath the farmland to the west continues beneath the modern town, with substantial remains now lying – and probably surviving to an as yet unknown extent – beneath gardens as well as houses.

Some of the key findings highlighted in this report focus on the most distant and most recent periods accessible through aerial archaeology – the Neolithic and the Second World War. The discovery of what appears to be a third early Neolithic causewayed enclosure is of national significance. A defining characteristic of the

early Neolithic period in the British Isles, the construction of causewayed enclosures – along with other broadly contemporary phenomena – was ultimately of continental inspiration (Last 2019). The suggestion that the earliest causewayed enclosures in Britain are mainly concentrated around the Thames Estuary, and that the previously discovered and partly-excavated enclosure at Chalk Hill, Ramsgate may be the earliest of all (Whittle et al 2011, 691, 897) underlines the potential for this region, and in particular this corner of Thanet, to play a key role in understanding the inception of the Neolithic in Britain.

The existence of three causewayed enclosures in such close proximity is intriguing, especially as all three are in the southwest corner of the Isle of Thanet, rather than on the mainland. It is also worth bearing in mind that an oval pit containing two burials and early Neolithic pottery at Nethercourt, a short distance to the north, has been suggested to possibly represent part of yet another causewayed enclosure (see Last 2019, 8). It is also worth highlighting that while pairs or larger groupings of causewayed enclosures are by no means unknown, they tend to occur singly, or if in groups they are generally more widely spaced. Another of Kent's coastal islands, Sheppey, is now known to possess two, while a site on the outskirts of Margate may well represent Thanet's fourth (Small forthcoming). If confirmed, the identification of a possible Neolithic oval barrow close to the causewayed enclosures west of Ramsgate is also highly significant, particularly given the marked absence of pre-Bronze Age funerary monuments in east Kent.

The quality and quantity of aerial photographs taken over Ramsgate during and after the Second World War highlight their value for researching these periods, particularly in terms of identifying a wide range of site-types and features whose presence may have been extremely short-lived, as well as poorly documented (if at all). However, it is analysis of documentary sources that will yield the detail necessary to more fully understand the histories, roles and contexts of these sites. The same also applies to post-war developments, of course, as exemplified by the case study presented in this report on Ramsgate's prefabs.

The identification of wartime structures and the history of Ramsgate's prefabs also underlines the potential for aerial photographs to have captured significant detail unlikely to be clearly represented, it at all, on contemporary maps. This is a point also clearly made in the reports on assessment of historic aerial photographs for the HAZ projects focused on Sunderland (Oakey 2018) and Weston-super-Mare (Carpenter 2018),. Consequently, there remains considerable potential for more detailed assessment of the changing character of Ramsgate's urban landscape from the 1920s to the present.

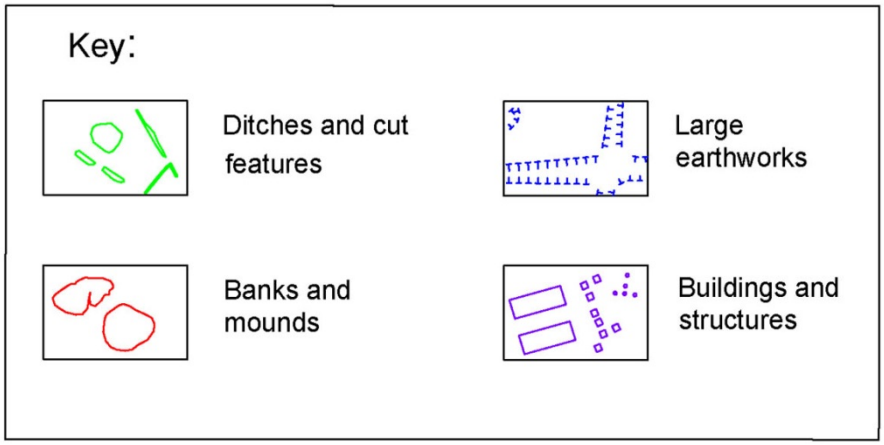
Finally, the role played by lidar has been limited, as outside the built-up area, the intensive nature of arable agriculture means that there is little above-ground survival of archaeological earthworks likely to be detected by lidar. However, the boundaries highlighted on p28 and shown in various illustrations (e.g. Figs 2, 5, 6, 13, 16, 21, 22 etc) are worth highlighting for follow-up work. As noted in the report, they appear to represent a pattern of land boundaries that certainly post-date the evidence for Roman settlement, but also seem for the most part to pre-date the

earliest Ordnance Survey maps of the area. Further archival research, including pre-19th century maps, would clearly be of value here.

APPENDIX

All archaeological features seen within the survey area were mapped in AutoCAD Map 2019. Aerial photographs were rectified to a plan view using the Aerial 5.36 rectification software. Features were mapped from a range of sources from 1941 to the present day, and some features, particularly buildings may have been removed since the date of the photograph. Other features may have been obscured by development or removed through quarrying.

Mapping Conventions used for the mapping from aerial photographs and lidar images: ditches (green) and banks (red) were mapped with no differentiation between features seen as earthworks and cropmarks. Buildings and structures were recorded as an outline (purple). The extent of medieval ridge and furrow was outlined with a polygon and the alignment of the furrows indicated with an arrow. Levelled ridge and furrow is magenta, while earthwork ridge and furrow is cyan.



REFERENCES

NB All online sources and references mentioned in this report were checked on 23rd October 2019.

Articles from the *Thanet Advertiser* newspaper cited in this report were consulted via the British Newspaper Archive (https://www.britishnewspaperarchive.co.uk/).

Allen MJ, Leivers M, Ellis C 2008 Neolithic Causewayed Enclosures and Later Prehistoric Farming: Duality, Imposition and the Role of Predecessors at Kingsborough, Isle of Sheppey, Kent, UK. *Proceedings of the Prehistoric Society* 74, 235-322.

Andrews P, Booth P, Fitzpatrick A P, Walsh K 2015 *Digging the Gateway: Archaeological landscapes of south Thanet*. The Archaeology of East Kent Access Phase II. Vol.1: The sites. Monograph No.8. Oxford Wessex Archaeology.

Barber M 2003 *Bronze and the Bronze Age. Metalwork and Society in Britain c2500-800 BC*. Tempus, Stroud.

Boden D C 2005 Ellington School, Pysons Road, Ramsgate, Kent. Archaeological Evaluation. *Canterbury Archaeological Trust. Annual Report* 30. p.27.

Blanchet E 2014 *Prefab Homes*. Shire Publications, Oxford.

Brooks,S and Harrington S 2010. *The Kingdom of the People of Kent A.D. 400-1066: Their History and Archaeology*. The History Press, Stroud.

Carpenter E 2018 *Great Weston Heritage Action Zone, Weston-super-Mare, North Somerset. Aerial Investigation and Mapping Project*. Historic England Research Report 50/2018.

Clark P, Shand, G, and Weeks J 2019 *Chalk Hill: Neolithic and Bronze Age discoveries at Ramsgate, Kent*. Sidestone Press, Leiden.

Cotton C. 1895. *The history and antiquities of the church and parish of St. Laurence, Thanet, in the county of Kent*. Simpkin, Marshall, Hamilton, Kent & Co, London.

Dobinson C 1996 *Twentieth-Century Fortifications in England vol. 1 Anti-Aircraft Artillery, 1914-1946*. Council for British Archaeology, York.

Dobinson C 2000 *Twentieth-Century Fortifications in England vol. VII Acoustics and Radar: England's Early Warning Systems 1915-1945*. Council for British Archaeology, York.

Dunning G 1966 Neolithic Occupation Sites in East Kent. *Antiquaries Journal* 46, 1-25.

Dyer C 1996 *A possible Interrupted Ditch at Margate, Thanet, Kent; Aerial Photographic Transcription and Analysis. A report for the RCHME: Industry and Enclosure in the Neolithic Project*. Unpublished archive report (available from Historic England Archive).

Egging Dinwiddy K, and Schuster J, 2009 Thanet's Longest Excavation: archaeological investigations along the route of the Weatherlees-Margate-Broadstairs wastewater pipeline; in Andrews P, Egging Dinwiddy K, Ellis C, Hutcheson A, Phillpotts C, Powell A, and Schuster J *Kentish Sites and Sites of Kent: A miscellany of four archaeological excavations*, 57-174. Wessex Archaeology Report 24.

Fitzpatrick, A 2018 Ebbsfleet, 54 BC: Searching for the launch site of Caesar's British Invasions. *Current Archaeology* 337, April 2018, 26-32.

Garwood P 2012 The Medway Valley Prehistoric Landscapes Project. *Past: the Newsletter of the Prehistoric Society* 72, November 2012, 1-3.

Gilbert C 2011 *Prefabs – A Solution to a Housing Crisis* (available online via http://epsomandewellhistoryexplorer.org.uk/MoreOnPrefabs.pdf).

Hamel A and Lambert V 2011 *South East Rapid Coastal Zone Assessment Survey (SERCZAS) Phase 1: National Mapping Programme Report (Blocks B-C & L-M)* Wessex Archaeology Report 71330.01 for English Heritage. English Heritage Research Report Series 128/2011.

Historic England 2018a *Introduction to Heritage Assets: Causewayed Enclosures*. https://historicengland.org.uk/images-books/publications/iha-causewayed-enclosures/

Historic England 2018b *Introduction to Heritage Assets: Prehistoric Barrows and Burial Mounds*. https://historicengland.org.uk/images-books/publications/iha-prehistoric-barrows-burial-mounds/

Historic England 2018c *Introduction to Heritage Assets: River Fisheries and Coastal Weirs*. https://historicengland.org.uk/images-books/publications/iha-river-fisheries-coastal-fish-weirs/

Humphreys R 1997 Thanet at War 1939-1945; in Cates M and Chamberlain D (eds) *The Maritime Heritage of Thanet*, 74-80. East Kent Maritime Trust.

Hutcheson A and Andrews P 2009 A Late Bronze Age, Anglo-Saxon, and Medieval Settlement Site at Manston Road, Ramsgate; in Andrews P, Egging Dinwiddy K, Ellis C, Hutcheson A, Phillpotts C, Powell A, and Schuster J *Kentish Sites and Sites of Kent: A miscellany of four archaeological excavations*, 199-248. Wessex Archaeology Report 24.

Isle of Thanet Archaeological Unit 1980 *Interim Excavation Reports 1977-1980*. Isle of Thanet Archaeological Unit.

Isle of Thanet Archaeological Unit 1988 Thanet Sites and Monuments Record ('An introductory pamphlet' plus 2 ring binders deposited with RCHME library c1988). Thanet District Council and Isle of Thanet Archaeological Unit.

Kokalj Ž, Zakšek K, Oštir K. 2011. Application of Sky-View Factor for the Visualization of Historic Landscape Features in Lidar-Derived Relief Models. *Antiquity* 85, 327: 263-273.

Last J 2019 *Prehistory, landscape and heterotopia: a contribution to the Ramsgate Heritage Action Zone*. Historic England Research Report Series no. 24/2019.

Lawson T. 2004c The Cinque Ports in Lawson T and Killingray D (eds), *An Historical Atlas of Kent*, 52. Phillimore, Chichester.

Lawson T and Chalkin C 2004, Medieval taxation: the Lay Subsidy of 1334–5, in Lawson T and Killingray D (eds), *An Historical Atlas of Kent*, 58. Phillimore, Chichester.

Lewis J 1723. *The History and Antiquities, ecclesiastical and civil, of the Isle of Tenet in Kent*. London.

Lewis J 1736. The History and Antiquities, ecclesiastical and civil, of the Isle of Tenet in Kent. 2nd ed., London.

Lowry B (ed) 1996 *20th Century Defences in Britain: An Introductory Guide*.. CBA York

LUC and Archangel Heritage Ltd 2018 *Historic Characterisation of Ramsgate*. Historic England Research Report 48/2018.

McKinley J. Leivers M, Schuster J, Marshall P, Barclay A J, and Stoodley N 2014. *Cliffs End Farm, Isle of Thanet, Kent: A mortuary and ritual site of the Bronze Age, Iron Age and Anglo-Saxon period*. Wessex Archaeology Report 13, Wessex Archaeology 2014.

Moody G 2008 *The Isle of Thanet from prehistory to the Norman Conquest*, Tempus, Stroud.

Oakey, M 2018 *Sunderland Heritage Action Zone. An Assessment of the Historic England Archive Aerial Photographs*. Historic England Research Report 22/2018.

Oswald A, Dyer C and Barber M 2001. *The Creation of Monuments: Neolithic Causewayed Enclosures in the British Isles*. English Heritage, Swindon.

Perkins D 2004 Oval Barrows on Thanet; in Cotton J, Field D (eds) *Towards a New Stone Age. Aspects of the Neolithic in South-East England*, 76-81. CBA Research Report 137. CBA, York.

Perkins D, 2010 Distribution of Bronze Age Barrows in North-East Kent. *Archaeologia Cantiana* 130, 277-314.

Poole K and Webley L 2008 Prehistoric Activity at Westwood, Broadstairs. *Archaeologia Cantiana* 128, 75-106.
Powell A, 2011 *Baking and brewing in a medieval settlement at Star Lane, Westwood, Thanet*. Wessex Archaeology, Old Sarum Park, Salisbury.

Quested R K I 2001. *The Isle of Thanet Farming Community: An Agrarian History of Easternmost Kent*. 2nd Edition. Privately Published.

RCHME 1989 *The Classification of Cropmarks in Kent. A report for the Monuments Protection Programme*.
http://research.historicengland.org.uk/Report.aspx?i=15662

Saunders A and Smith V 2001 *Kent's Defence Heritage*. Kent County Council.

Small F 2002 *Richborough Environs Project, Kent*. English Heritage Aerial Survey Report Series AER/12/2002.

Small, F forthcoming *Cropmarks of a Possible Neolithic Causewayed Enclosure at Cliffs End, Kent*. Historic England Research Report Series 49/2019.

Spain P 2011. Ramsgate's Remarkable Tunnels. *Subterranea* No. 27, Sept 2011, pp39-46.

Stebbing WPD 1951 Research in South-East Kent, 1949-1950. *Archaeologia Cantiana* 64, 150-3.

Stockman R (ed) 1986 *The History of RAF Manston 1916-1986*. RAF Manston.

Sweetinburgh S 2004. Landholding in 1300, Lawson T and Killingray D (eds), *An Historical Atlas of Kent,* pp. 48-49. Phillimore, Chichester.

Taylor MV and Collingwood RG 1921 Roman Britain in 1921 and 1922. *Journal of Roman Studies* 11, 200-244.

Whitelock D 1961 (ed) (with Douglas D and Tucker S) *The Anglo-Saxon Chronicle: A Revised Translation*. Eyre and Spottiswoode, London.

Whittle A, Healy F and Bayliss A 2011 *Gathering Time: Dating the Early Neolithic Enclosures of Southern Britain and Ireland*. Oxbow Books, Oxford.

Young C 2004 The Physical Setting, in Lawson T and Killingray D (eds), *An Historical Atlas of Kent*, 1-6. Phillimore, Chichester.

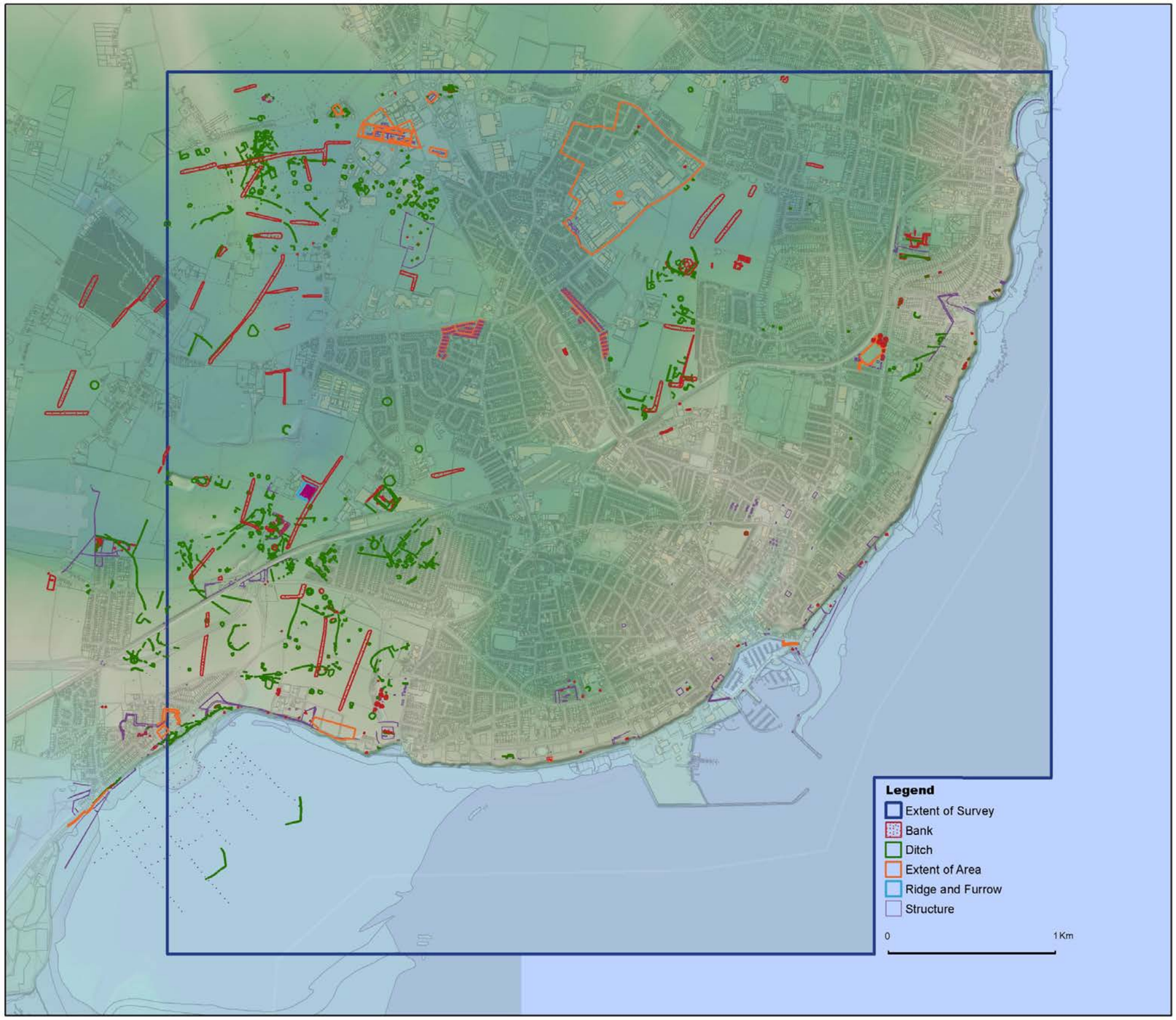


Figure 2: Topographic map of Ramsgate HAZ survey area with all transcribed archaelogical features recorded from aerial photographs and lidar. © Historic England; © Crown Copyright and database right 2019. All rights reserved. Ordnance Survey Licence number 100024900.

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