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## RESEARCH NOTES – POST-MEDIEVAL

### A SURVEY OF DUTCH AND FLEMISH GABLES IN KENT

Having spent many years as an estate agent in Thanet the locations of properties there with these distinctive curvilinear gables are well known to the author. In retirement, in order to date a house with Dutch gables of a fellow member of the Isle of Thanet Archaeological Society, he has undertaken an eight-year countywide study of these features, the aims of which were to:

- record and visit every property in Kent with a curvilinear gable, the emphasis being on farmhouses, cottages and lesser houses although noting the 'grand' examples and Victorian revival;
- establish as close a dating as possible of each;
- analyse the differing shapes and attempt to detect changing and/or local styles;<sup>1</sup>
- record any available details of who may have built them originally.

One of the most intriguing features of Kentish Dutch and Flemish gables is their prevalence in the north-eastern quarter of the county.<sup>2</sup> This is a point emphasised in an early volume of *Archaeologia Cantiana* about Thanet:

In Minster [Thanet] village there are several houses, built of brick in the time of Charles II or of William III, which have such prettily curved gable ends, as were characteristic of the Caroline reigns in England. Perhaps there is no part of Kent which retains, within an equally small area, so many examples of these graceful gables. Near Minster Vicarage, an old house with two such gables had in iron RK 1693.

There are in Reading Street [Thanet] several houses of the time of William III, which have the pretty gables, so plentiful in Thanet. ... some of them bearing the initials of those who built them. At present, almost the entire village consists of such (gables) ... Modern vandalism has not, however, altogether spared them, for two or three have been washed over with lamp black [*sic*] – walls, roofs, chimneys and all! Few ... have come to our time unmutated, and hideous sashes and modern joiners work have replaced most of the original mullioned woodwork and quarried glazing of the windows. The principal number of these cottages are arranged in pairs forming a single parallelogram on plan.<sup>3</sup>

There are now only two in each of the villages mentioned giving an indication of the number we have lost overall. There is no mention of Dutch, Flemish or Huguenot origins in the article and in fact no distinctions were discernible in this study so Netherlandish would perhaps be a more accurate description than 'Dutch'. It should also be noted that Deal with 28 in a small area has a greater concentration than Thanet's 58.

Over the years *Archaeologia Cantiana* and other publications on Kentish history have contained numerous articles on the 'strangers' from the Low Countries,

refugees from religious persecution, lace makers and horticulturists settling at various places in Kent from the twelfth century onwards. These settlers (together with Dutch engineers employed over many years to drain marshes and fens in seventeenth-century eastern England) are popularly believed to have introduced these architectural features when building their homes. However, it has become clear that this is an oversimplification. Quiney points out that the so-called Dutch gables probably came to Kent indirectly from the Low Countries via Norfolk although this author's research has indicated that whilst the styles are very alike, Kent developed independently as in both counties the period of these gables is identical and both counties copied their style from slightly earlier grand houses. Furthermore, pan tiles are the norm in Norfolk, but rare in Kent. Also Cook says '[Kent] building practises vary from E Anglia'.<sup>4</sup> Trerice in Cornwall 1571, Kirby Hall, Northants 1572, Wollaton Hall, Notts c.1580 and Knole in Kent c.1603 are clearly the influence – fashion travels downwards.

Jardine and Schama both detail the influence of the Dutch on the English refugees from Cromwell's Commonwealth and the popularising of Dutch art, pottery, architecture and horticulture on their return.<sup>5</sup> Edwards makes the important point that the bulk of immigrants were not in a position to build for themselves until the late seventeenth and early eighteenth centuries and by then were much more likely to adopt English styles. She further states (as does Schama) that Dutch fashion was influenced by the Flemish moving north after 1585.<sup>6</sup> It appears then that fashion was the most common and likely reason for the spread of these features.

### Summary of the survey findings

The survey found 180 Kentish vernacular buildings dating to before 1750 displaying curvilinear gables. [*A Gazetteer of these properties is published on the KAS website.*] Some were two or three tiny cottages, now one, so counted as one. There are a number of remnants (mainly Deal) where only a part of a curved gable exists and no pediment; these have not been included in the total but are noted as 'lost'. Documentary and other sources suggest that there were at least eighty examples in Kent that have not survived [*see website also*]. Deal lost many during the Second World War hostilities while a good number in Folkestone, Thanet and Dover have certainly disappeared as a result of redevelopment.<sup>7</sup>

Almost a fifth of the surviving examples are to be found in Thanet and all but 12 are located east of Chartham. In the villages to the west of Ashford, there is a concentration of clover leaf shaped gables that were built by two families – the Tokes and Surrenden-Derings sometimes of a later date that are not included but again indicating a local fashion.<sup>8</sup> Of the existing Dutch- and Flemish-gabled properties identified in the survey it was possible to closely date nearly a third (60). Some of these could, of course, be precisely dated where date panels are incorporated in the structure of the property. The range of these dates, which are both earlier and later than generally credited, are set out below (**Table 1**) and show a peak of building in the second half of the seventeenth century and the first half of the eighteenth century. Various sources attest to the building boom in the later seventeenth century after the 1660 Restoration of Charles II. (The bulge in dates from 1660 to 1720 is mirrored in the figures the author has collated for Norfolk and Suffolk.)



TABLE 1. COMPARATIVE DATES OF KENT'S DUTCH AND FLEMISH GABLES WHICH ARE FAIRLY SECURELY DATED

	Up to 1620	1621-1640	1641-1660	1661-1680	1681-1700	1701-1720	1721-1740	1741-1780
Thanet	3	0	1	5	3	4	1	1
Rest of Kent	3	2	5	9	8	5	4	5
Total	6	2	6	14	11	9	5	6

Those with only shaped dormers or porches not included.

For most of the remainder only an approximate date can be given, as set out in the Kent Historic Buildings List, usually bracketed as early, mid or late seventeenth century, or the same three-way division of the eighteenth century. The range of dates for the whole group is set out in Table 2. The date to give for some houses with curvilinear gables is a problem.<sup>9</sup> But the little altered flint and brick *Serene House* off the High Street, Broadstairs, is dated by KCC as 1603 and although having straight gables in front has curvilinear gables surviving at the rear.

TABLE 2. COMPARATIVE DATES OF KENT'S DUTCH AND FLEMISH GABLES ONLY APPROXIMATELY ESTIMATED

	Early 17th	Mid 17th	Late 17th	Early 18th	Mid 18th	Late 18th
Thanet	0	3	5	8	0	0
Rest of Kent	6	2	10	4	0	2
Total	6	5	15	12	0	2

### *Physical Characteristics*

Notes were made during the survey of any features that might be common to these Dutch- and Flemish-gabled properties such as the type of brickwork bond. Flemish bond would be expected possibly but is not any more common than other types. In Germany it is known as *Polnischer Verband* (Polish bond) which gives a clue to the route the style took.<sup>10</sup> English bond is used but many properties have no discernible bond.

Using the list of definitely dated houses, the brickwork bond was observed and was found to reinforce the view that English bond was earlier than Flemish bond (one style replacing another) the changeover occurring after 1675. Having said that, one example of Flemish bond appears as early as 1628 but on a major house (*Godinton*) but then first on a vernacular house in 1680 (*Perry Farm*, near Wingham). Stretcher bond only became popular when the insulation properties of a cavity was realised after the period of this study.

A rare brick bond known as Minster bond, where a course of stretchers is followed by a course of alternate headers and stretchers, is found in Thanet in part

at *Pepper Alley* at St Nicholas at Wade, although the majority of the brickwork is in Flemish bond; there is also another bond of three stretchers, one header, three stretchers and so on, on the north gable in part. Parts of the rear wall at *Elizabeth Cottage* at Rowling, near Eastry, are in Minster bond also the ground floor of the front whilst the first floor is in Flemish bond as are the side walls. Both above cases appear to have had major rebuilding in the past which may explain this. The name of this bond may come from the lost properties in Minster, Thanet. At Uphousden, stretcher bond is found on top of older brickwork.

Dormer windows in the roof seem to be quite common, but were often added later after the Window Tax of 1696 was repealed in 1851. Many rural houses had small circular, oval or rectangular windows in the gable but most were bricked up, presumably due to the Tax and can thus be tentatively dated to before it.

Properties with Dutch and Flemish gables, whether urban, village or rural are almost entirely built of brick with two main exceptions:

1. When added to older properties, mainly farmhouses, the original building is often timber framed, the extension always being of brick.
2. In Thanet, flint is widely used as the main material but invariably with brick dressings for windows, doors and corners, the ratio being three brick built buildings (two with flint foundations) to two built of flint.

*Stone Farm*, Broadstairs (Fig. 1), was built in 1710 in brick, but the later extension



Fig. 1 Stone Farm, Broadstairs: a rare example of a property having two gables of differing shapes and/or pediment style.





Fig. 2 St Peter's Farm, Broadstairs, showing the Thanet pediment. Owned by the Mockett family for over 300 years, now fortunately by an architect.

of 1839 was of flint, presumably gathered from the nearby beach, to avoid the Brick Tax (1784-1850) which was still in force. Deal is a case on its own: most of the cottages there are terraced and around half of them are rendered, all being built of brick as far as can be ascertained – a number being somewhat mutilated and/or 'improved' so difficult to classify.

*St Peter's Farm*, Broadstairs (Fig. 2), has a date plaque of 1710 on the front wall; the porch has a date plaque of 1682. The house was in fact built in 1657 (on an earlier flint base, also at *Chilton Farm*), the porch was added in 1682, and the front of the house was then re-built in 1710 to satisfy the then current Queen Anne fashion with a more symmetrical frontage! (c.f. *Queen Anne House*, Deal, also 1710). Wall anchors giving a year are sometimes suggested as an indication of Dutch influence but only appear rarely, as do those with initials.



Fig. 3 Hospital Lane, Goodnestone: a feast of brickwork with large pilasters and chimney breasts and a triangular pediment.

### *Pediments*

The classic pediment of a triangle (**Fig. 3**) is sometimes quoted (Pevsner *et al.*) as an indicator of a gable being Dutch. However, of the possible 180 curvilinear gabled properties in the survey only 17 have a triangular pediment. The most common pediment or 'top' is round, (semi-circular or compass) with 26 examples and close behind is the Thanet pediment (with what one might call an open pediment reversed) with 25, of which 17 are in Thanet – the others nearby. A close third come the segmental pediments with 22 (**Fig. 4**). In 18 cases a chimney replaces the pediment (see **Fig. 5**) and there are a number with no comparables. In Littlebourne one can see two examples of a rare 'open pediment over a broken pediment' as seen also at *Tudor Cottage* at Wingham Well and nowhere else which was probably the inspiration.

Deal was excluded from this breakdown as some pediments there are barely visible or mutilated but most had the round or segmental top (apart from two Thanet pediments and two others). If you add Deal's pediments to the rest of Kent, round and segmental pediments comprise almost 50% of the total. The round and segmental tops vary enormously in size from the case of *Poulton House* near Ash, where the curve is the width of a wing, to *Hilltop* at Finglesham which is tiny comprising just six headers superimposed on the chimney and above a string course and a recessed panel – unfortunately illegible.





Fig. 4 Worth Farm has segmental pediments and the date 1675 inset into the brickwork.

### *The shapes of the sides*

There are only four basic shapes: a concave curve, a convex curve, an ogee curve which is a combination of the first two, a step (a short rectangular break) and a straight section – though this is very rare – although it appears twice in the cottage and outbuilding at *Howletts* and at *Denne Hill*. From such a few shapes it is amazing how many differing gables shapes there are. The most frequent sequence is probably: a concave curve or an ogee, a step, then a convex curve finished with a step invariably over a kneeler (where the brickwork extends outward from the wall to allow an overhang of the roof). This sequence most closely follows the roofline. To divide the pediment from the sides the builder normally inserted a string course (of projecting bricks parallel with the other brickwork), sometimes also a dogtooth course (of bricks at an angle to the others). In books that touch fleetingly on these gables there are two main reasons postulated as to the reason for the gable sides extending above the roof line:

- to prevent fire spreading to neighbouring properties.
- to prevent thatch being lifted by the wind.

The first is unlikely as most properties with Dutch gables in Kent are detached with no nearby dwellings<sup>11</sup> – the terrace of five in Ramsgate High Street having the extended gables only on the ends. The second factor is feasible at least in a few cases – many more houses originally had thatched roofs that, after fires, are now tiled,





Fig. 5 Church Gate Farm, Woodnesborough: is unique in having (from the top) an ogee, step, a concave curve, step, a convex curve on both gables, the apex of the gables having chimneys.

e.g. *Pepper Alley* in St Nicholas at Wade thatched in early photographs. However, in most cases the gable does not extend high enough above the roof line to afford protection – thatch is usually at least a foot thick – the gables frequently only extend half this distance, once again indicating fashion. *Hode Farm* Patrixbourne is worthy of special mention as it once again indicates fashion. The original gable is dated 1566 and is stepped (also the porch) whereas the north gable is curvilinear with the date 1674. Stepped gables are earlier than curved ones.

In conclusion the lines of curvilinear gables in Kent are more Flemish than Dutch for the reason noted above. A gable more Dutch than Flemish or English is Bourne Mill, Colchester dated 1590/1.

### *Porches*

Another group should be mentioned, those properties that were built without curvilinear gables but had a porch with the fashionable curves added later. There are 25 of these ranging from the timber framed *Tudor house* c.1440 at Chislet Forstal with porch added 1637, the flint and brick *West Northdown Farmhouse* at Cliftonville which has the date in brick of 1652 in the flint, to *Brook Farmhouse* near Wingham, built 1695 and porch added in the 19th century. They are equally

varied in shape, though the Ashford area ones are uniformly round. Probably the best is on West Northdown Farm being in brick mainly with flint in the apex and with a true pediment, ogee curves and little pilasters that add to the decorative build of the main building. St Peter's Farmhouse, as mentioned, has the still legible plaque but the sides of the porch are quite worn as though cows were in the habit of rubbing themselves against it – the green in front being the village pond with cows drinking from it in living memory.

### *The Builders*

This has been the frustrating part where further work into deeds and archives is required as few owners know and the occasional tablet with initials hasn't always helped. Having said that, in Broadstairs the Culmer family were responsible for Milton Place (now lost) a C over D S over 1673 (or 8) being on the date plaque, and possibly others. The owner of *Rushbourne Manor* at Hoath named Twyman as the builder, a T over H S over 1659 being in the chimney. However, after the author's article appeared in in *British Archaeology* (Sept/Oct 2014), David Gordon pointed out that 'Triform' initials record a couple – the top initial the surname, the lower the first names. This form was also used on silver but from the late 17th century to the late 18th century – possibly copied from houses. Dr S. Ladyman stated that *Chilton Farmhouse* 1714 in Queen Anne style (near Ramsgate) was built by the Curlinge family and appears to have been built on the site of an older, probably Tudor house.

### Acknowledgements

To echo Lewis' *History of Thanet* of 1723 where he dedicated his work in 'gratitude to a Place where I have now lived almost eighteen years with great pleasure and satisfaction' the author in turn dedicates this work to my adopted county of over 40 years which has so many beautiful villages and buildings which need careful treasuring and of which the majority of owners have been so helpful and supportive of this work.

Mention must be made also of the help given by members of Thanet D.C. and KCC, particularly from Ben Croxford, formerly Kent's Historic Environment Record Officer, who provided a copy of the Historic Building Lists where those gables were mentioned.

Also the late Arthur Percival whose study *Dutch Influence on English Vernacular Architecture with particular reference to East Kent* (1966) gave a starting point. It is unlikely this project would have seen the light of day without his inspiration and enthusiasm and to staff at Margate Museum that introduced the author to Percival's work; also Broadstairs Library staff who located so many obscure books.

Some generalisations and synthesis come from a mixture of many sources and my thanks go to those authors too numerous to mention. The author would also like to record his appreciation to two Dutch lady friends (for translations, Dutch websites and material) who incidentally translated *halsgevel* as 'neck gable or façade' making the point that the Dutch *halsgevel* is 'stretched up' of which there are no copies in Kent. The members of The Isle of Thanet Archaeological Society





Fig. 6 Northwood, Hopes Lane: this house has a double ogee separated by a step – the author knows of only one other survivor in South-East England but has a copy of an 1881 drawing from Margate Library of an identical shape that was in King Street, Ramsgate, but long since demolished – see note 3.

([www.iotas.org.uk](http://www.iotas.org.uk)) deserve a mention for their help especially Marilyn and Roger of Northwood Farmhouse (Fig. 6) where it all started.

DENIS GORDON TAYLOR

#### ENDNOTES

<sup>1</sup> This also entailed a visit to East Anglia to compare regional differences.

<sup>2</sup> The same eastward concentration is found elsewhere in England although in Lincolnshire they line the River Trent only and in Norfolk they are widespread bar Breckland; they also appear from Cornwall to Scotland mostly in the larger property.

<sup>3</sup> Extract from an article in *Archaeologia Cantiana*, xii (1878) by the Rev. W.A. Scott Robertson which includes five drawings of Dutch-gabled cottages in Reading Street and one in Broadstairs. *Thanet Illustrated* (A scrapbook c.1900 in Margate library) has eight drawings of Dutch gables in Thanet by James Weir.

<sup>4</sup> A. Quiney, 1993, *Kent Houses*, Antique Collectors Club; O. Cook, 1982, *English Cottages and Farmhouses*, Thames and Hudson.

<sup>5</sup> S. Schama, 1987 *The Embarrassment of Riches – Dutch Culture in the Golden Age*, Harper Perennial; S. Schama, 2009 *A History of Britain 1603-1776*, Bodley Head; L. Jardine, 2008 *Going Dutch – How England Plundered Holland's Glory*, Harper Press.

<sup>6</sup> E. Edwards, 2002, 'Interpretations of the Influence of the Immigrant Population in Kent in the Sixteenth and Seventeenth Centuries', *Archaeologia Cantiana*, cxxii, 275-292.

<sup>7</sup> N. Dermott, The Conservation Officer of Thanet District Council was told that there were a number of Dutch gables in the 1930s in the York Street area of Ramsgate that were demolished for a John Poulson scheme that never materialised. Drawings and photographs of lost gables have been found, some appearing in a book *The Cape House* by Obholzer *et al.*, Grosvenor House, 1985, comparing South African and English examples.

<sup>8</sup> Oddly there is a pair of semi-detached houses at Upper Goldstone north of Ash, near Sandwich, with the clover leaf gables and Toke crest.

<sup>9</sup> An example of this is *Pett Place*, at Charing – an early eighteenth-century house with a sixteenth-century core over Norman cellar remnants; the Dutch gables were added in the nineteenth century.

<sup>10</sup> Northwards from Italy to the Baltic ports then westwards through Poland and Germany to the Netherlands by the first quarter of the sixteenth century – stepped and curvilinear gables being found in all these areas. Stepped gables (in Kent at Small Hythe church by 1517) possibly being an extension of a crenellation over the gable as at Neuwhwanstein castle in Germany.

<sup>11</sup> In The Netherlands the buildings are often terraced but the gables invariably face the road.

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## THE VARIETY OF BRICK TYPES AND SIZES USED AT OLD ST ALBANS COURT, NONINGTON

Bricks are the commonest of our building materials and their very ubiquity and variety should mean that they can add invaluable information about the uses to which they have been put, and when. Indeed, we can admire them in situ and marvel at their aesthetic and architectural impact which, in stylistic terms, will give us some approximate dates for the structures they form. However, at the bottom of an archaeological trench, dates will tend to be derived from the surrounding materials rather than the brick itself and an ancient wall much repaired provides more of a challenge in intellectual guesswork than a dateable record of construction history. Moreover, before the days of modern profligacy, a whole brick was something to be reused wherever possible which adds further layers of confusion to any dating process. Nevertheless, a better ability to date a brick with some precision would provide important evidence, whatever the location.



However, bricks fundamentally are earth, and dating the earth itself is not much help. Nevertheless, scientists have produced many ways of categorising bricks and even, to a limited extent, ways of dating bricks but the costs are as yet very high because the techniques are new and this sort of technical analysis requires expensive support.<sup>1</sup>

Brick making in England seems to have died with the departure of the Romans,<sup>2</sup> one assumes because demand for substantial amounts of new brick came to a halt. Brickmaking itself required some considerable expertise and organisation whereas the use of wood was an easy reversion to existing long standing, widespread skills. On the other hand, Roman ruins were extensively plundered for brick as indeed former owners of *Old St Albans Court* did at St Albans Abbey in Hertfordshire with *Verulamium*.

The earliest surviving brick in Kent,<sup>3</sup> at Allington Castle (after 1281) and Home's Place, Appledore (c.1366, then easily accessible by water) may well have been imported as this trade is documented at Sandwich in the 1370s.<sup>4</sup> Small amounts of bricks were used in Sandwich houses in the fourteenth century.<sup>5</sup> However, there is no record of brickmaking at Sandwich until 1467-9,<sup>6</sup> and presumably none earlier elsewhere in Kent. The yellow brick of Fisher Gate in Sandwich bore the date of 1581. The earliest bricks at Old St Albans Court (red) are of this period (c.1556, see below).

Red brick first appears used decoratively in combination with knapped flint at Dent-de-Lion, Garlinge (Margate) before 1445 and in diapering at Tonford Manor, Thanington, licensed in 1448. But the earliest really big project recorded for Kent seems to be the hundreds of thousands of bricks that Cardinal Morton commissioned for Bell Harry Tower in 1494-8. Morton was well used to brick – he had rebuilt the hall at Hatfield in 1478 as well as utilising brick for works in the archbishop's palaces at Knoles, Croydon, Maidstone, Ford and Charing. This extensive use may suggest that the expertise and knowledge to produce brick reliably in quantity and quality had been around in Kent for some time. While Sandwich imported brick in quantity and cheaply (and that would apply to anywhere more or less accessible by water) that still leaves a substantial hinterland where transport costs would make imported bricks uneconomic.<sup>7</sup>

From the fifteenth century onwards the sheer utility and practicality of bricks led to their rapid spread, and inevitably to regulation. The first attempt seems to have been in 1571 followed by Charles I in 1625 for the City of London and a series of Statutes in 1725, 1729, 1769, and 1776. The specifications (and the dimensions in Bell Harry)<sup>8</sup> are shown in Table 1, together with the official standards. Surprisingly, government did not get around to taxing them until 1784 and it took until 1803<sup>9</sup> to plug the loophole around the size of brick, probably to the relief of bricklayers to whom a basic requirement would have been a brick that could be picked up with one hand rather than some of the monsters developed to avoid tax.

### *The brick assemblage at Old St Albans Court*

Having looked at the wider picture, this paper now considers utilising brick types as an historical dating medium, at least in our local area. It is with this objective in mind that we sought to categorise the bricks at *Old St Albans Court*, a Tudor Manor

TABLE 1. SPECIFICATIONS OF THE BELL HARRY TOWER BRICKS AND SUBSEQUENT STANDARD SIZES

Date	Statute/Location	Size (in.)	Description
[1493]	[Bell Harry Tower]	[8½ x 4 x 2¼-2½]	[Red; pink; muddy yellow]
1571	(13 Eliz) London	9 x 4¼ x 2¼	
1625	Proclamation 1 Ch 1 London	9 x 4¾ x 2¼	
1725	Statute 12 Geo 1 London	9 x 4¼ x 2½ 9 x 4¼ x 2⅝	
1729	Statute 3 Geo 11 London	8¾ x 4½ x 2½	
1769	Statute 10 Geo 111	8½ x 4 x 2½	
1776	Statute 17 Geo 111 England	8½ x 4 x 2½	This remains the modern dimension although the metric equivalent is marginally smaller.

with documented seventeenth-, eighteenth- and nineteenth-century changes, and make the information available for wider benefit.

In the vicinity of Nonington there are substantial deposits of brick earth,<sup>10</sup> the material traditionally dug in the Autumn, allowed to over-winter and then moulded in the Spring. Evidence of brick making activity has been observed at the western edge of the village by Butter Street and Holt Street farm and the name Brickfield Piece in Fredville Park perhaps is a relic of the construction of the eighteenth-century manor house there.<sup>11</sup> Similar remains have been observed near Beauchamps Lane at the eastern end of the village<sup>12</sup> which adjoins *Old St Albans Court*. The earliest brick maker so far discovered is William Knowles who is recorded as standing surety at the 1600 Quarter Sessions but he was probably one of a number.

The following details are found in the nineteenth-century census returns:

Census year	No. bricklayers/builders
1841	7
1851	10
1861	8
1871	12
1881	16
1891	10

This was in a total working male population of approximately two hundred and fifty, the vast majority of whom worked in agriculture.<sup>13</sup>

*Old St Albans Court* itself – named locally after its owners, the Abbey of St Albans from 1096 until 1540 – probably started as an open hall, perhaps a Wealden type structure in the early 1300s.<sup>14</sup> A wing was added with a stone-lined garderobe at the far end somewhat later but the whole was rebuilt substantially in brick in 1556 (see **Table 2**).<sup>15</sup> A large excavation, first recorded in a 1501 Abbey Rent Roll, is shown close to the house on a 1629 Estate Map which is assumed to have



TABLE 2.

Internal garderobe wall: 14th-century bricks brought from Beauchamps to make up mid-1500s wall

<i>Yellow Stretchers</i>	No. Bricks
Brick size (inches)	
8½ x 2¼	1
9 x 2½	1
9¼ x 2	1
9¼ x 2½	1
9 x 2	1
9 x 2¼	1
<i>Roseate brick</i>	
6½ (broken) x 2½	1

1556

End (NW) wall of 1556 house

<i>Stretchers</i>	
Brick size (inches)	No. Bricks
9¼ x 2¼	6
9½ x 2½	4
10 x 2½	2

Tower interior

<i>Stretchers</i>	
Brick size (inches)	No. Bricks
9 x 2¼	3
9¼ x 2¼	1
9½ x 2¼	8
9¾ x 2	1
9¾ x 2¼	4
9¾ x 2½	1
10 x 2½	1
<i>Headers</i>	
Width (inches)	No. Bricks
4¼	1
4½	8
4¾	12
5	1
5¼	1

5½	1
Height (inches)	No. Bricks
2	2
2¼	20
2½	3
Note: occasional blue headers observed in sample	

Tower Exterior NW and NE elevations

<i>Stretchers</i>	
Brick size (inches)	No. Bricks
9 x 2	1
9¼ x 2	1
9½ x 2	3
9¾ x 2	1
9½ x 2¼	3
9¾ x 2¼	1
<i>Quoins</i>	
Brick size (inches)	No. Bricks
9¼ x 5 x 2¼	1
9½ x 4½ x 2	4
9½ x 4½ x 2¼	1
9½ x 4¾ x 2¼	1
9½ x 5 x 2	1
<i>Blue Headers</i>	
Brick size (inches)	No. Bricks
4¼ x 2	1
4¼ x 2¼	1
4½ x 2	2
4½ x 2¼	2
4¾ x 2	1
4¾ x 2¼	1
<i>Red Headers</i>	
Brick size (inches)	No. Bricks
4¼ x 2¼	1
4½ x 2	1
4½ x 2¼	1

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TABLE 2 (cont.).

Front of House - exterior

<i>Stretchers</i>	
Brick Size (inches)	No.Bricks
9 x 2¼	1
9¼ x 2¼	3
9½ x 2¼	8

SW elevation (walled garden/ chimneys)

<i>Stretchers</i>	
Brick Size (inches)	No.Bricks
9 x 2¼	1
9 x 2¼ (blue)	2
9 x 2½ (dark red)	1
9¼ x 2¼	1
9½ x 2	2
9½ x 2¼	6
9½ x 2½	1
<i>Headers (blue)</i>	
Width (inches)	No. Bricks
4¼	2
4½	5
4¾	1
Height (inches)	No. Bricks
2¼	5
2	3
Note: remnants of blue diaper pattern included in sample	

Garden wall extension from SW Elevation, possibly 1556, certainly pre-1666

<i>Stretchers</i>	
Brick Size (inches)	No.Bricks
9½ x 2¼	6
9½ x 2½	3
<i>Headers (red)</i>	
4¼ x 2¼	1
4½ x 2½	4
4¾ x 2¼	3
4¾ x 2½	1

Demolished Tudor house brick fragments from well

<i>Headers (various reds)</i>	
Width (inches)	No. Bricks
4¼	6
4½	11
Height (inches)	No. Bricks
2¼	16
2½	1
<i>Header (blue)</i>	
4½ x 2¼	

1666

Foundations of Tudor building demolished  
1666

<i>Stretchers (medium red, misshapen/ burnt)</i>	
Brick Sizes (inches)	
9 x 4¼ x 2½	
9¼ x 4¼ x 2¼	
9¼ x 4½ x 2¼	
9½ x 4½ x 2½	
9¾ x 4 x 2¼	
9¾ x 4¼ x 2½	

1790

Culvert

<i>Stretchers (red)</i>	
Brick Size (inches)	No.Bricks
8 x 2¼	1
8¾ x 2¼	5
9 x 2¼	1
9¼ x 2¼	5
9½ x 2¼	1
<i>Headers</i>	
Brick size (inches)	No. Bricks
4 x 2¼	2
4 x 2½	1
4¼ x 2¼	5



## RESEARCH NOTES

TABLE 2 (cont.).

1849

Pre-Devey garden wall (with Devey coping):  
brick with incised date in situ

<i>Quoins</i>	
Brick size (inches)	No. Bricks
$8\frac{1}{2} \times 4 \times 2\frac{1}{4}$	1
$8\frac{1}{2} \times 4 \times 2\frac{1}{2}$	3
$8\frac{3}{4} \times 4 \times 2\frac{3}{4}$	1
$9\frac{1}{4} \times 2\frac{1}{4} \times 4$	1
<i>Stretchers</i>	
Brick size (inches)	No. Bricks
$9 \times 2$	1
$9\frac{1}{2} \times 2\frac{1}{4}$	1
<i>Headers</i>	
Brick size (inches)	No. Bricks
$4 \times 2\frac{1}{4}$	2
$4\frac{1}{4} \times 2\frac{1}{2}$	2
$4\frac{1}{2} \times 2\frac{1}{4}$	1
$4\frac{1}{2} \times 2\frac{1}{2}$	1

1869

Devey Gate into walled garden

<i>Quoins</i>	
Brick size (inches)	No. Bricks
$8\frac{1}{2} \times 2\frac{1}{2} \times 4\frac{1}{8}$	1
$9 \times 4 \times 2\frac{3}{4}$	2
$9 \times 4\frac{1}{4} \times 2\frac{1}{2}$	1
$9 \times 4\frac{1}{4} \times 2\frac{3}{4}$	6
<i>Headers</i>	
Brick size (inches)	No. Bricks
$4\frac{1}{4} \times 2\frac{3}{4}$	1
Note: lower courses consist of a stone plinth	

Devey Stable & Coach Block exterior  
west face

<i>Stretchers</i>	
Brick size (inches)	No. Bricks
$8\frac{3}{4} \times 2\frac{1}{2}$	1
$9\frac{1}{4} \times 2\frac{1}{2}$	1
<i>Headers (darker red)</i>	
Brick size (inches)	No. Bricks
$4 \times 2\frac{1}{2}$	4
$4\frac{1}{4} \times 2\frac{1}{2}$	2

Devey Granary

<i>Stretchers</i>	
Brick size (inches)	No. Bricks
$8\frac{1}{2} \times 2\frac{1}{2}$	1
$8\frac{3}{4} \times 2\frac{1}{2}$	6
$8\frac{3}{4} \times 2\frac{3}{4}$	1
$8\frac{7}{8} \times 2\frac{3}{4}$	4
$9 \times 2\frac{1}{2}$	1
$9 \times 2\frac{3}{4}$	4
<i>Headers</i>	
Brick size (inches)	No. Bricks
$4\frac{1}{8} \times 2\frac{1}{2}$	1
$4\frac{1}{8} \times 2\frac{3}{4}$	5
$4\frac{1}{4} \times 2\frac{1}{2}$	2
$4\frac{1}{4} \times 2\frac{3}{4}$	1
<i>Blue Headers</i>	
Brick size (inches)	No. Bricks
$3\frac{3}{4} \times 2\frac{1}{2}$	1
$4 \times 2\frac{1}{2}$	1
$4\frac{1}{8} \times 2\frac{1}{2}$	1
$4\frac{1}{8} \times 2\frac{3}{4}$	7
$4\frac{1}{4} \times 2\frac{3}{4}$	2
<i>Headers (dark red)</i>	
Brick size (inches)	No. Bricks
$4 \times 2\frac{3}{4}$	3

TABLE 2 (cont.).

SE Boundary Wall		1876	
<i>Quoins</i>		<i>Devey Restoration NE wall</i>	
Brick size (inches)	No. Bricks	Brick size (inches)	No. Bricks
$8\frac{3}{4} \times 4\frac{1}{4} \times 2\frac{1}{2}$	1	$8\frac{3}{8} \times 2\frac{1}{2}$	1
$9 \times 4 \times 2\frac{1}{2}$	1	$8\frac{1}{2} \times 2\frac{1}{2}$	1
$9 \times 4\frac{1}{2} \times 2\frac{1}{2}$	5	$8\frac{5}{8} \times 2\frac{3}{4}$	1
<i>Stretchers</i>		$8\frac{3}{4} \times 2\frac{1}{2}$	7
Brick size (inches)	No. Bricks	$9 \times 2\frac{1}{2}$	5
$8\frac{3}{4} \times 2\frac{1}{2}$	5	<i>Headers</i>	
$8\frac{7}{8} \times 2\frac{1}{2}$	1	Brick size (inches)	No. Bricks
$9 \times 2\frac{1}{2}$	3	$3\frac{3}{4} \times 2\frac{1}{2}$	1
<i>Headers</i>		$4 \times 2\frac{1}{2}$	5
Brick size (inches)	No. Bricks	$4 \times 2\frac{3}{4}$	1
$4\frac{1}{4} \times 2\frac{1}{2}$	5	$4\frac{1}{2} \times 2\frac{1}{2}$	6
$4\frac{3}{8} \times 2\frac{1}{2}$	1	$4\frac{1}{4} \times 2\frac{3}{4}$	1

been the source of the brickearth and there is leasing evidence of brick kilns close by in 1665.<sup>16</sup> We know that there was a further rebuilding and reshaping of the house in 1666<sup>17</sup> and it seems highly unlikely that any other than these brickearth sources would have been used. Further substantial work in brick was undertaken in 1790.<sup>18</sup> All this is in documentary records as well as confirmed by archaeological excavation where the bricks used in this work have been clearly identifiable in situ by building archaeologists.<sup>19</sup> The same applies to work carried out in 1869 by George Devey in rebuilding the Stable block and in 1876-8 when he built the (Grade I listed) *New St Albans Court* for William Oxenden Hammond on a rise above the ancient manor house.<sup>20</sup> In addition to the evidence of brick kilns on the estate from the seventeenth century onwards, brick making was carried on in the adjacent hamlet of Easole into the twentieth century.<sup>21</sup>

Our methodology is to record the sizes, shapes and colours of the bricks in situ at the relevant periods, and also to analyse the mortar (see below). Obviously, where they are still in situ, only the visible dimensions of the bricks can be recorded. Since this is, in effect, raw data, we have drawn a few conclusions against national standards and made some observations on our own bricks:

- the earlier Tudor and Stuart bricks have a different consistency, being softer than their later counterparts and also not such a strong red as the 1870 brick. This may be a function of time but more likely is due to firing techniques. The local brickearth does not appear to vary but that is not a scientifically supported observation. On the other hand, the blue headers always seem to have been well burnt whatever the period.

The variation in length is not as great as in later bricks although bricks up



to 10in. long are not uncommon, a feature which was still evident in 1790. The width, however, could be up to 5½in. but not less than 4½in. With a depth between 2-2½in, these bricks appear recognisably wider and less thick than later products.

- the stone wall backing the garderobe noted in the first major enlargement of the house contained a few yellow bricks, uniquely so since none have been found elsewhere in the visible fabric of the house or on the excavated site. These appear to match bricks being excavated currently by the Dover Archaeological Group under the direction of Keith Parfitt from what appears to be a substantial and rich manor house on a rise about half a mile west called Beechams or Beauchamps, provisionally dated to the first half of the fourteenth century. These bricks appear to be Sandwich bricks and therefore would have been brought by road from there.<sup>22</sup>

They were most probably brought the short distance down from the Beauchamps site by the Hammonds who bought it in 1558 having previously rented it. However, the provisional dating of the site where they are in situ is early 1300s, a century and a half before brick making is known in Sandwich, so these may well be Low Country imports. Potentially, this could be evidence for what may be some of the earliest medieval building in brick in east Kent.

- the 1790 bricks had an even greater variation from the standard with a length varying from ½in. under to 1¼in. over. However, as with the 1870s brick, they look solid and well made and have stood well the test of exposure and time.
- the incised 1849 brick in the pre-Devey garden wall may well have an additional significance in that similar bricks form part of what is assumed to have been a rebuilding in brick of the south-east front of the medieval hall in the main house. This would have been the oldest part of the house probably dating back to the substantial rebuilding which took place in 1399 under the Abbey of St Albans. This work would not have affected the large 1666/1790 mansion which fronted north-east. Impacting on only one smaller room in the large house, it was probably seen as 'Dilapidations': it was not mentioned in the MSS Family History. George Devey further altered it substantially probably in 1869 as he did the garden wall itself (see below).
- something of a surprise but understandable in hindsight, was that the bulk of bricks used by Devey in his works were handmade, presumably locally, half a mile down the road in Easole by Henry Maxted, Builder and Brickmaker, and his eight-strong workforce recorded in the census. The nearest railway station at that time was about three miles away over country lanes at Adisham and it is known that the stone for Hammond's new Pulham garden<sup>23</sup> came via that route as probably did the heavy duty engineering bricks but since the skills and materials were effectively on site, it was clearly more economical to take advantage of that for the bulk requirements even though the extensive manufacturing capacity of the Sittingbourne brickworks was less than an hour down the main railway line to London.

On the other hand, Devey was clearly intrigued and excited by the different forms and shapes that brick could provide and his exuberance is well displayed in a number of architectural details known to be typical of his style. Evident in the stable block are ragstone footings rising unevenly into brick-

work to invite belief it is built upon medieval ruins; a battlemented tower is decorated with diaper work and ringed with corbelled machicolations, both of which also feature in the adjoining gated entrance to the courtyard, the gate itself outlined with a hood mould of brick; tumbled-in bricks form gable-end eave slopes; and a Dutch triangular pedimented gable sits above the courtyard clock.

- local manufacture was far from the machine accuracy of the bricks pouring out of those extensive brickworks around Sittingbourne from the mid nineteenth century onwards: of the 1869 and later bricks measured, the length could vary by up to  $\frac{1}{2}$ in. either way and the breadth and thickness by up to  $\frac{1}{4}$ in. Local mould making was clearly not a precise business but differences of 6 per cent and more on all the dimensions against a hundred year old standard suggest that this was not a priority for architects engaged on country work at least in our part of Kent. George Devey was a man with a national reputation but there is some evidence that he was impatient of this sort of detail although as we indicate above, he was very conscious of the overall impact of his work.

### *Mortar Analysis*

The mortar analysis was not conducted under microscopic laboratory conditions (see **Table 3**). After weighing, the sample was crushed, not ground, and examined by eye for its description. Hydrochloric acid was added to it diluted slightly (about 1:3) with distilled water in a glass beaker to dissolve the lime binder. The chemical reaction, dispersion, was studied to determine whether it was a lime rich mix. The sample was then left for 48 hours for the aggregate to settle and drained off carefully, then washed in distilled water and separated by pouring through a paper filter and left to dry. This dry sample was weighed so it could be compared to the original weight and thereby the proportion of lime binder calculated. Then the original gauge, or mix ratio, was established.

Fourteen mortar samples were taken of all phases of brickwork from the 1556 Tower interior through to the foundations of the 1666 work to the Devey 1876 restoration. Their dry weight ranged from 2.5g to 15g dependent on the accessibility and availability of each sample.

The results show, slightly surprisingly, that every one of the samples were of lime mortar, no cement at all being found. Secondly the earlier building from 1556 to 1666 had strong lime rich mix ratios on average of 1:2 (1 lime: 2 sand), using a very soft sand of rounded grains, not well graded, light grey/brown in colour. Perhaps the strong gauge was used as it was known the sand did not contain any larger grit fragments for strength, as is the case with modern sands (i.e. sharp sand used in many conservation repair mortars). This may also suggest that river sand was used.

Of the four 1790 building samples, all were different in their mix ratios. The culvert samples ranged from 1:1 to 1:4, and were different in appearance as were the aggregates used which may be because this was a culvert, and out of sight, so appearance was of no importance.

The three Devey restoration samples had an average mix ratio of 1:3, with two of them containing red angular fragments, possibly brick dust used as a pozzolan



TABLE 3. MORTAR ANALYSIS

Sample	Description	Dry weight (g)	Dispersed weight (g)	Dispersion	Gauge (mix ratio) lime: aggregate
1556 Tower interior	White, fine rounded grains with occasional sub-angular white granules (possibly unslaked lime/chalk).	2.64	1.27	Rapid & vigorous	1:2
Pre-1666 Extension from SW face	White, soft density with frequent soft round grains, occasional medium sub-angular white granules (possibly unslaked lime/chalk), occasional small sub-angular red brick grains.	5.35	1.43	Rapid	3½:1
Pre-1666 demolished fragments, found in well	Pinkish grey cream, frequent small soft rounded grains with moderate large angular red brick fragments, moderate large sub-angular white granules (possibly unslaked lime/chalk), occasional medium black sub-angular granules.	4.85	3.13	Rapid	1:3
Pre-1666 foundations	White, hard density with frequent small soft rounded grains and moderate medium white angular grains (possibly unslaked lime/chalk). Occasional large angular fragments of flint.	4.14	1.92	Medium	1:1
Foundations of 1666 house	White, medium density with frequent small white round soft grains and moderate medium & large angular granules. Occasional large sub-angular black granules.	13.69	6.71	Rapid	1:2
Foundations of 1666 NE front wall	Greyish white of hard density with frequent small rounded grains, moderate medium sub-angular granules, moderate large sub-angular fragments (possibly unslaked lime/chalk), occasional medium & large dark grey/black sub-angular fragments.	8.15	4.48	Rapid	1:1
1790 culvert to front of 1666 house	Grey cream, of crumbly, low density. Occas. large unslaked angular granules of lime, frequent small rounded grains of sand moderate small hard sub-angular black grains (probably flint).	15.05	12.55	Rapid	1:4
1790 NW Tower jointing	Bedding mortar. Grey cream, soft, low density. Frequent small rounded grains, moderate medium sub-angular white granules (possibly unslaked lime/chalk), occasional large angular black granules. Not well graded.	11.53	6.79	Very rapid	1:2

1790 NW Tower pointing	Dark grey/black with frequent small rounded grains (possibly soot/ash), moderate medium sub-angular granules, occasional large angular red brick granules possibly used as a pozzolan.	14.33	9.95	Rapid	1:1½
1790 culvert at rear of earlier house	Brownish white, soft density. Moderate small rounded grains, moderate medium sub-angular granules, occasional large sub-angular fragments (possibly unslaked lime/chalk), occasional small sub-angular brick fragments.	5.85	2.69	Rapid	1:1
Devey Gate 1869; lower stone courses of brick gate	Moderately hard, grey powdery with frequent small rounded grains, occasional angular dark red brown fragments, occasional sub-angular black fragments (possibly ash).	5.54	2.62	Weak-moderate	1:1
Devey Restoration 1876 NE wall existing house	White, medium density. Frequent small rounded grains. Pinkish brown fine rounded grains with occas. black angular hard granules, occasional large sub-angular white granules (unslaked lime/chalk?), occas. medium red brick coloured sub-angular granules (used as a pozzolan?).	2.32	0.89	Moderate	1:2½
Devey Restoration 1876 outbuildings boundary to NW	Dark grey of hard density with moderate soft rounded small grains and moderate medium sub-angular granules. All aggregates are dark grey/black (possibly soot/ash).	7.68	5.43	Rapid	1:3½



(a strengthening additive possibly as an alternative to cement), and the other with black/grey aggregate indicating the use of soot or charcoal for colouring.

Finally, in terms of the brickwork itself, we should record that the 1556 brickwork is in English Bond with alternate courses of headers and stretchers. There is no extant 1666 walling in place that we can identify with certainty, or 1790 above ground work. However we do have culverts and cisterns of the 1790s which display a fairly regular English Bond clearly designed for strength underground. The 1869 and 1876 Devey brickwork is English Bond and we have commented earlier on his elaborate use of architectural decoration. Interestingly the face work he applied to the existing outbuildings on the north-east boundary is in Flemish Bond with each course consisting of alternate headers and stretchers. This raises the question of whether Devey or the builder decided this!

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<sup>1</sup> The Department of Archaeology at Durham have developed techniques using luminescence, see Bailiff, I.K., *Archaeometry*, 49-54, 820-851, 2007. The School of Mechanical Aerospace and Civil Engineering at Manchester were using rehydroxylation to analyse fired ceramics (*Current Archaeology*, 234, 2009, 5). The authors are providing data for them but the temperature variables in the surrounding environment apparently require much further study. The same went for petrographic microscopy, X-Ray Diffractometry (XRD), and Scanning Electron Microscopy (SEM) with an Energy Dispersive X-Ray Diffraction attachment (EDX).

<sup>2</sup> R. Brunskill and A. Clifton-Taylor, 1977, *English Brickwork*, Wardlock, 13.

<sup>3</sup> For the history of medieval brickwork in Kent, see K. Gravett, 1989, 'Brickwork in Kent', in *A Celebration of Kent's Architectural Heritage*, KCC, 11-13; J. Newman, 2013, *Kent: North East and East*, The Buildings of England, 58.

<sup>4</sup> The National Archives: SC/894-896.

<sup>5</sup> H. Clarke, S. Pearson, M. Mate and K. Parfitt, 2010, *Sandwich: a study of the town and port from its origins to 1600*, Oxbow, p. 308.

<sup>6</sup> Kent History and Library Centre: Sa/AC1, f.168.

<sup>7</sup> Tiles are known to have been produced in England in quantity from the 1200s onwards and it seems unlikely that something as useful as brickmaking would have taken another two centuries to develop unless there were cheaper alternatives readily available. *British Archaeology* 13 April 1996; Ian Betts Museum of London; P.J. Drury, *The production of brick and tile in medieval England*, 27.

<sup>8</sup> Nathaniel Lloyd, 1925, *History of English Brickwork* (2003 reprint), The Antique Collector's Club, 12.

<sup>9</sup> Gerard Lynch, 1994, *Brickwork, History, Technology and Practice*, Vol. 1, Donhead, London, 13.

<sup>10</sup> Peter Hobbs, 2005, 'Old St Albans Court Nonington', *Archaeologia Cantiana*, CXXV, 2005, 273-287, n. 50.

<sup>11</sup> Smart, Bisson and Worsamm, 1966, *Geology of the country around Canterbury and Folkestone*, HMSO, 236. Observation by Clive Webb recorded on Nonington Village Website, 2009.

<sup>12</sup> Clive Webb's observation (see note 11).

<sup>13</sup> Public Record Office Census returns 1841-91.

<sup>14</sup> E. Hasted, *The History and Topographical Survey of County of Kent*, 2nd ed., ix (1797-1801), 251-262; K. Parfitt, H. Jones and P. Hobbs, 2001, 'Investigations at Old St Albans Court Nonington', *Kent Archaeological Review*, 146, 134.

<sup>15</sup> Hobbs, *op. cit.* (see note 10).

<sup>16</sup> KHL/C, U442 P30; U471 T511.

<sup>17</sup> *Topographical Miscellanies* (London 1792), Vol. 1: London; Kent *sub* St Albans Court.

<sup>18</sup> MSS Family History; Hobbs, *op. cit.* (see note 10).

<sup>19</sup> Howard Jones, 2002, unpubl. article, 'The Architecture of Old St Albans Court'.

<sup>20</sup> Jill Allibone, 1991, *George Devey, Architect, 1820-1886*; British Architectural Library, *Geo Devey*, 56-7, and 22, 28, 43, 72, 98 and 131.

<sup>21</sup> Clive Webb, *op. cit.*; David Lewis, *pers. comm.* The census of 1891 shows that about 65% of the male working population of Nonington were engaged in agricultural activities but 20% of the remainder were involved with bricks.

<sup>22</sup> The road from Sandwich to Nonington was straightforwardly via the Woodnesborough Gate and, for example, the Crown assembled no less than 6,000 carts in Sandwich as well as a mass of miscellaneous other supplies for the 1359-60 campaign in France so nobody would have minded or even noticed a few day trips down the road to Nonington, particularly when ordered by the commanding general. H.J. Hewitt, 1966, *The Organisation of War under Edward III 1338-62*, Manchester.

<sup>23</sup> Ian Sayer, *pers. comm.* He was the last head groundsman for Nonington College and his grandfather worked for the St Albans Court estate and is recorded in the official Obituary as having prepared the mausoleum at the 1901 funeral of William Oxenden Hammond, the commissioner of the new St Albans Court in 1876.

### SOME UNDERGROUND FEATURES ON THE LEES COURT ESTATE IN SHELDWICH/BADLESMERE

The Lees Court Estate covers an area of some 6,900 acres (2,792ha), 2,663 acres (1,077ha) of which are located in the parishes of Sheldwich, Leaveland and Badlesmere to the south of Faversham. It has been in the Sondes family for over 700 years with Lees Court Mansion (Leaveland) being built in 1652 by Sir George Sondes on the site of an earlier house. Since 1996, following the death of her husband, the fifth Earl Sondes, the estate has been managed by Countess Sondes who has taken a great interest in the historic landscape. The estate contains a number of underground features which the writer and other members of the Kent Underground Research Group (KURG) have examined in recent years at the invitation of Lady Sondes.

The term denehole has become a generic name for a small mine accessed by a vertical shaft that was dug to extract chalk. The term chalkwell (or draw well) can also be used for those dug from the 17th century onward. The vast majority of these simple pits were dug to provide broken or crushed chalk for an agricultural top dressing, a process known as chalking or marling. On a low Ph soil such as Thanet Sand or Brickearth the alkaline chalk neutralizes the acid. On heavy Clay or Clay-with-Flint soils an application of crushed chalk also helps to break up the heavy soil and assist drainage.

Some deneholes were also dug to supply kilns producing lime for both agricultural use as above and for building purposes such as the production of lime mortar and lime wash. Deneholes were being dug from at least as far back as the early Iron Age and continued in one form or another until the beginning of the twentieth century, one of the last in Kent being dug at Doddington in 1908. The mining team varied but usually consisted of three men, one to cut out the chalk and two to haul up the load using a windlass or a simple pulley with the rope attached to a horse.

#### *Lees Court Road denehole*

Four deneholes have been documented on the Lees Court Estate although the



number recorded is certainly only a small fraction of those originally excavated. An unusually large denehole in remarkably good condition has been preserved at Sheldwich Lees. It is located under a protective manhole cover in the front garden of a house on the south side of Lees Court Road, Sheldwich Lees, approximately 0.8km south-south-east of the parish church of St James. (NGR withheld at landowner's request.) The local geology is sedimentary Seaford Chalk overlaid with superficial Clay-with-Flint deposits.

In 1970 the site was visited by the writer together with local archaeologist and active KAS member, the late Jim Bradshaw, when a simple sketch plan was produced and notes made on the underground features. A more detailed measured survey was conducted in 1977 by T. Reeve of the Chelsea Speleological Society. In 1980 a partial re-survey was made by the writer as Reeve was concerned that there may have been some inaccuracies around the shaft area. These fears proved to be unfounded. In April 2013 a further study was made of the denehole, when KURG facilitated an underground visit by Countess Sondes. The accompanying plan (**Fig. 1**) was plotted from the cumulative survey notes of 1977, 1980 and 2013.

The denehole is entered by a narrow circular shaft initially 1.0m in diameter. Where the shaft passes through the Clay-with-Flint deposit it has been lined with roughly squared flints standing on a ring of bricks at the junction of the chalk stratum. From this point the shaft widens as it descends through the chalk to an estimated 3.0m in diameter at floor level which is 12m from the surface. The original floor at the base of the shaft is obscured by a mound of debris 2.5m high comprised mainly of 20th-century building demolition rubble and general rubbish. Two tunnels have been excavated from the shaft, one to the north-west, 4m high and 16m long, and one to the east which joins another large chamber at a T junction. From this intersection to the left is a curving passage 31m long and 6m high running to the north-east. To the right is a tunnel sealed off with a vertical wall constructed of irregular sized chalk blocks bonded with lime mortar (**Plate I**). The top section of this wall appears to be of later construction than the lower portion with the chalk blocks sitting on a rough layer of red bricks. The floor level of the blocked passage is 1.0m higher than the floor of the north-east chamber.

Almost opposite the short passage leading from the shaft is another chamber heading south-east 10m long and 4m high. The roof levels of this chamber and the connecting passage are lower than that of the north-east chamber by 1.0m. The north-east chamber appears to be a continuation of the sealed-off section.

All the galleries or chambers were worked via a series of benches, a common method of extraction where the roof level is excavated first then the floor progressively lowered in a number of 'lifts' of around 1-1.5m.

On the floor of the north-east chamber is a pile of flints (**Plate II**) collected by the miners. Whilst the primary purpose of the denehole was to extract chalk, the flints were a useful by-product. A little further along is a large mound of chalk rubble – the last excavated chalk in the mine.

Numerous tool marks are visible that show that the denehole was dug using a short headed iron pick, the usual excavation tool for this type of small mine. When mining ceased the shaft was sealed with a flint cap resting on a single course of bricks surmounting the flint lining of the shaft with the top part of the cap being constructed with red bricks. At a later point in time (probably when the

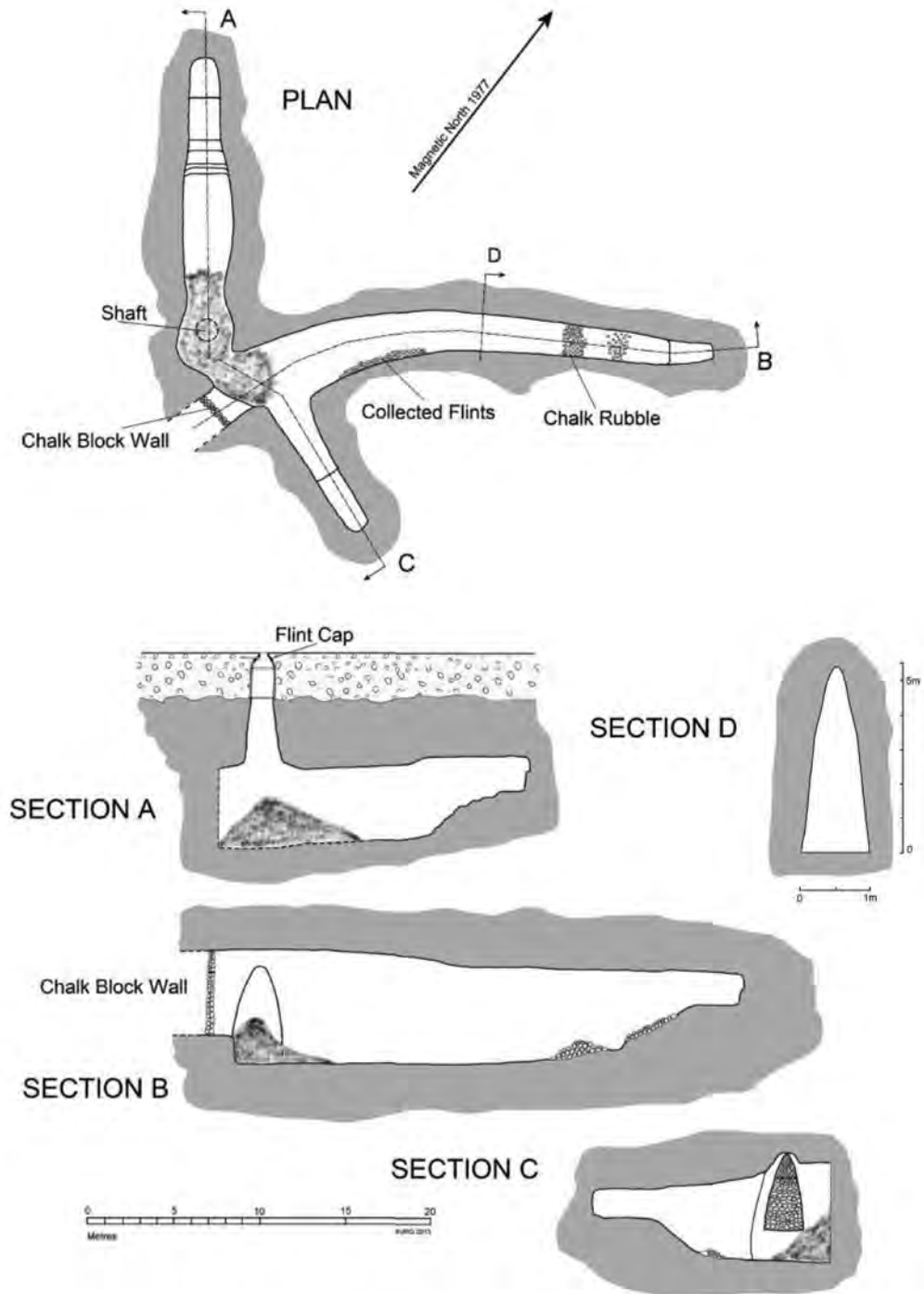


Fig. 1 Plan of Lees Court Road denehole.





PLATE I Lees Court Road denehole: the sealed-off tunnel.

adjacent houses were being constructed) the capping was disturbed and the shaft exposed. This probably occurred during the laying of a pipe for a soakaway, with the construction trench breaking into the top of the brick capping. It would seem that the decision was made to utilise the shaft as a ready-made soakaway and the drainpipe was incorporated into a repaired cap and a 0.64m x 0.49m rectangular manhole access constructed over the shaft so that the site could be inspected in the future.

If chalk miners encountered an area of unstable ground they often sealed that section off with either flint or chalk block walls to prevent the loose material breaking into the working mine. Chalk extraction then continued away from the suspect area. This type of preventative action took place long before the chambers were dug to their full depth and the safety walls tended to be fairly roughly built in a 'dry stone wall' fashion without any mortar bonding.

The only times the writer has encountered blocked-off, full height tunnels, is when a shaft bottom was sealed off. In some areas in Kent, when mining had ceased, it was common practice to wall off the chambers so that the shaft could be economically backfilled without the spoil spilling into the tunnels. The chalk block wall in the Sheldwich denehole could, therefore, be holding back the in-fill from an older shaft which may explain the very uncommon layout of underground workings. When the newer shaft was sunk the eastern tunnel broke into the older excavation. To save the effort of abandoning the mine and sinking a new shaft in a less undermined area, the excavators chose to continue and dug out the north-west



PLATE II Lees Court Road denhole: the flint pile in the north-east chamber.

chamber and reworked the older mine by lowering the floor level by 1.0m and extending the length of the north-east chamber. At around this time the top portion of the chalk block wall was removed. This was probably done to determine the stability of what lay beyond the barrier. It was then re-sealed using chalk blocks resting on a rough layer of red bricks of the same type as used in the construction of the capping of the shaft. Below the bricks there is evidence of a thin layer of wood which may have supported the upper portion of the wall during construction. In front of the chalk block wall in the chamber walls are a number of square cut holes which were probably anchor points for a crude wooden scaffolding used when the top section was breached and re-sealed.

The methods used in extracting the chalk would suggest a date of excavation between the early seventeenth century and the late nineteenth century. If the denhole was dug to obtain chalk purely for use as an agricultural top dressing then a date before the seventeenth century is less likely as the heavy clay with flints soils overlying the chalk could not be effectively tilled until plough technology improved in the seventeenth century. The problems of transporting a heavy load across clay fields meant that the shafts would be sunk next to, or in the middle of, the fields to be treated.

If some or all of the chalk was burnt for lime for construction purposes then the expansion of the village in the seventeenth and eighteenth centuries would suggest that the denhole was sunk to extract chalk, at least some of which, was used to



burn for lime to provide the lime mortar. There are probably a number of other deneholes in the area, dug for the same purpose. There is no evidence of a purpose-built lime kiln nearby but the chalk was probably burnt in a simple temporary clamp type kiln.

The writer's view is that the open shaft and the north-west chamber were dug in the late seventeenth to early eighteenth centuries and the sealed shaft and the original form of the north-east and south-east chambers were excavated a little earlier, possibly early to mid-seventeenth century. Whilst chalk was being extracted from the north-west chamber the two older tunnels were reworked and extended and the floor lowered by around 1.0m. The long lengths of the chambers indicate that some method of transporting the chalk from the working face to the base of the shaft must have been used. A simple wooden wheel-barrow was the usual conveyance in a denehole of this size and there would probably have been two men working underground; one to cut out the chalk and the other to barrow it to the shaft bottom.

The denehole is in a remarkably fine condition with very little change from when the miners abandoned it. It is to be preserved by the estate and Lady Sondes wishes to keep the site accessible. She has personally descended the denehole several times and has recently commissioned a survey by a geotechnical engineer to confirm its long term stability.

#### *Denehole at Gosmere farm, Badlesmere*

In September 2013, at the invitation of Countess Sondes, the Kent Underground Research Group relocated the site of a previously known shaft on Gosmere farm, Badlesmere. The site was first recorded by Jim Bradshaw in 1990:<sup>1</sup>

After a preliminary visit, members accepted the invitation of the farm manager, Mr Bill Harbour, to survey a chalkwell at TR 0203, 5676. This site had previously collapsed from the rusting away of corrugated iron sheets that had been used to cap it. This had dropped only 2m and had been filled, only to collapse again revealing chambers. The shaft was 1.4m in diameter and 12m deep to floor level.

The open shaft was covered with steel sheets and buried with soil after Bradshaw's visit.

In 2013 the shaft was exposed using mechanical plant and a modern measured survey was conducted by H. Farrer and J. Puckett from KURG. The excavation consisted of a 1.4m diameter shaft leading to two opposing chalk headings, 3.8m high and 2.9m wide at floor level, running north and south. Halfway along the southern chamber were two side chambers 2.4m high. A large cone of debris obscured the base of the shaft which was 11.3m from the surface.

The British Geological Survey notes that the superficial deposits are Quaternary clay and silts. It would be tempting to suggest that the slightly lighter soils could have been brought into arable cultivation before the heavy Clay-with-Flint ones; thus a date of excavation could be before the seventeenth century. It is much more likely, however, that this denehole is contemporary with the larger Lees Court Road example and the chalk raised was used as an agricultural top dressing. Depending on the tonnage per acre used this small denehole would have produced enough chalk to dress approximately 5-6 acres (2.2-2.4ha).

The two small side chambers had been dug after the main southern chamber had been excavated. It was normal practice to dig such side passages at the same time as the main passage with the roofs of the secondary chambers being the same height as the primary. In this case the side chambers had been dug later, possibly because the miners had miscalculated the amount of material raised from the denhole and had to re-excavate to get the extra chalk needed. The shaft was re-sealed and covered once more following the KURG survey.

### *Fisher Street Quarry Tunnels*

An open pit takes a large area of land out of agricultural use, so to reduce the footprint of the quarry on the surface, extraction often continued beyond the boundary of the quarry by driving tunnels into the working faces. There are many examples in Kent of chalk quarries with associated underground tunnels.

One such set of chalk caves was examined in October 2009 following a request from the Administrator of Lees Court Estate. The caves are located in the eastern face of an old chalk quarry lying between the 85 and 90m contour on the eastern side of a shallow valley on Fisher Street Farm, Sheldwich (TR 0315 5457). The local geology is Seaford Chalk overlaid with approx. 1.0m of recent deposits. The exposed chalk has numerous horizontal and vertical joints many of which are loose and friable.

Ordnance Survey plans of 1871-1890 show a quarry in the southern half of a small copse with a single lime kiln marked in the south-west corner. The 1897-1900 plans depict the site as an 'Old Chalk Pit' and show that the quarry had been extended to the north. Two 'Old Lime Kilns' are shown, the original as on the 1887 plan, and another adjacent to the north-east. The 1907-1923 plans show the quarry but the lime kilns are absent. None of the cartographic sources consulted indicates the presence of caves or tunnels at this location.

The underground features consist of four hand-picked tunnels cut into the base of the 7.0m high chalk quarry face that runs roughly north-south. Numerous tool marks can be seen which show that the caves were dug with standard size pick-axes. Graffiti from the 1880s to the present date are well represented on the walls. For ease of description the caves have been numbered one (the most northerly) to four (the most southerly):

Cave 1 is 11.20m long, 2.5m wide at floor level tapering to approximately 0.4m wide at the roof level of 3.2m. There have been many falls from the roof at the rear of the cave with the soffit migrating upward. A large pile of fallen chalk obscures the floor at this point.

Cave 2 is the smallest of the caves being only 6.3m long, 1.4m wide and 2.3m in height. It is possible that this cave was excavated after the other three were completed. There have been a few relatively recent falls from the roof though not as severe as in Cave 1. There are two small natural solution features exposed in the lower half of the northern wall.

Cave 3 is the longest at 12.0m and is 2.4m wide and joins with Cave 4 8.5m in from the quarry face. There have been a number of falls notably at the far end where the roof level is migrating upwards and at the junction with Cave 4. These latter falls are very recent and are the result of spalling from the



chalk pillar. The chalk is very loose with both horizontal and vertical joints separating.

Cave 4 is approx. 0.30m lower than cave three and is 9.9m long, 3.3m wide and has a roof height of 4.10m.

The tunnels were dug in close association with the quarry and lime kilns. Towards the end of the quarry's working life, when expansion of the boundaries would have taken more valuable land out of cultivation, the tunnels were dug to continue supplying the kilns with chalk. The chalk and lime would have primarily been used for agriculture.

The general style of the tunnels is typical of those dug in the latter half of the nineteenth century. The evidence from the Ordnance Survey plans would indicate a date of around 1870-80.

### *Investigation of a Lime Kiln at Fisher Street*

During 2008 estate workers excavated the site of one of the filled-in lime kilns under the direction of the estate manager, Elizabeth Roberts, who invited KAS member J. Preston to examine the site in 2011. A survey was made in 2013 by A.J. Daniels and J. Preston and the following is a summary of the resulting report:

During 2008 workers on the Lees Court Estate excavated a lime kiln located at Fridhill Wood on Fisher Street Farm, Sheldwich. The site was inspected by J. Preston (JP) and A.J. Daniels (AJD) in 2011 and it was proposed to survey the site in the future. The chalk caves associated with the kiln were the subject of a report by the Kent Underground Research Group dated October 2009. JP and AJD returned to the site on the 13th August 2013 to survey the kiln.

The kiln was built into the ground, the base of the kiln being approximately 4.0m below the ground. It was built in brickwork 675mm square and 1.0m high. An unloading door and flue-hole 450mm wide and 900mm high to the top of a semi-circular arch was constructed in one side. This opened into an unloading chamber 1.2m wide and 2.5m to the soffit of the arched roof. The chamber was 2m long leading to a flight of steps which had been reconstructed when the kiln was re-excavated. An iron grating was set in the base of the kiln 450mm above the floor. At the top of the square brickwork, the brickwork was laid 225mm thick in a circle with a diameter of 1m (the same as the diagonal of the square). Each subsequent course was laid with a diameter 50mm larger than the preceding course until ground level was reached where the diameter was 2.6m. This created the cone shaped kiln with a capacity of approximately six cubic metres.

At the front of the unloading chamber was a wall of brickwork 1.7m wide increasing to 1.9m at ground level. A bullnosed coping was originally set on the top of the wall. The semi-circular roof of the unloading chamber was built sloping 300mm. A course of bricks projected 50mm on each side at the springing of the arch (presumably to hold up the centering of the arched roof). The arch was constructed of adjacent rings of 225mm wide brickwork. The bonding of the brickwork was generally English bond, but sometimes the header courses were two or three courses apart. It appears to have been built by local semi-trained bricklayers. The gap between the edge of the brickwork and the face of the chalk excavation was filled with flint set in mortar.

The kiln, which was built about 1870/1880, was a continuous operation kiln

meaning new fuel and chalk could be added at the top while the lime and ash were unloaded above and below the grating at the bottom of the kiln. The lime appears to have been carried up the steps to unload the kiln. This seems to be an unusual method of operation. The kiln would seem to have gone out of use by 1907.

Thanks are recorded to Lady Sondes for her interest in the history of the site, and the estate manager Elizabeth Roberts for contacting J. Preston to make him aware of the kiln site and providing access to the site. R.F. LeGear of the Kent Underground Research Group provided a copy of the report, 'Lees Court Estate – Archaeological Assessment of Chalk Caves' and also answered some of this report's authors' queries.

### *Swine Wood Quarry Tunnels, Sheldwich*

These tunnels are located in an old overgrown chalk quarry in the south-west corner of Swine Wood at 83m A.O.D., next to Lime Kiln Hill in the parish of Sheldwich. The centre of the quarry is at TR 0211 5534. The local geology is Seaford Chalk overlaid with approx. 1.0-2.0m of more recent deposits. As in the Fisher Street Farm caves, the exposed chalk has numerous horizontal and vertical joints towards the top of the strata, many of which are loose and friable.

Early Ordnance Survey plans depict a 'Chalk Pit' with what appears to be a building or structure projecting into the quarry from the north-west face. If this was the site of any lime kiln/s it is most unusual for the O.S. cartographers not to label it as such. The 1897 to 1900 plans show the site as 'Old Chalk Pit'. The structure is still depicted. Subsequent plans show an 'Old Chalk Pit' but the structure is not shown.

The Swine Wood site was visited in November 2009 by members of KURG and a survey of four accessible chalk caves was conducted. The old quarry has been used as a convenient dump for a considerable time and the base is covered by 1.0 to 2.0m of fill which is now overgrown. The sides of the quarry are obscured by sloping piles of debris which has covered the entrances of several man-made caves that were known to have been dug from the quarry. At the time of the visit only one tunnel (Cave 1) was readily accessible via a 0.9m high opening between tree roots. The sites of three other tunnels were identified from small depressions in the sloping debris at the chalk faces of the quarry. These were enlarged by KURG members to a sufficient size to allow investigators to enter.

The *first cave* is located in the south-east face of the quarry and is the longest of the surveyed tunnels at 18.0m. It is 1.92m wide at the base tapering to approx. 0.4m at roof level which is 2.26m above a floor comprised of a thick layer of chalk fragments. These small pieces of chalk have been spalling off the roof and walls for a considerable time. Tool marks from a standard size pick were visible in a number of areas. No graffiti was found although any from the time of the tunnel's excavation would probably have flaked off by now.

The *second cave* is 10m west of cave one and has been dug from the south-west face of the quarry. Access was gained by digging out a small hole which revealed a tunnel 10.2m long and 1.7m wide. At 1.54m high it is a little lower than Cave 1 and is 8.0m shorter. As in Cave 1 the floor is comprised of fallen chalk fragments. The difference in length may be explained by the



fact that Cave 2 proceeds toward the public road but stops at the boundary of the wood. The excavators wisely avoided undermining the highway. It is likely that other tunnels, now obscured by fill, were excavated from this face and it is assumed that they also stopped at the boundary.

The *third cave* is located in the north-east end of the quarry and was only entered with some difficulty. Almost all of the original cave space has been filled with chalk debris. The accessible void is the result of prolonged roof failure which has resulted in the collapse migrating up toward the surface. As fragmented chalk occupies far more volume than when in-situ, the tunnel has become filled with debris leaving a space only 0.6m high, 0.65m wide and 5.0m long.

The quarry tunnels were dug to obtain chalk when the open pit was nearing the end of its working life. The excavated chalk would have been used in its raw state as well as being burnt for lime, primarily for agricultural use although some may have been used for building work on the estate. There are no visible remains of any lime kilns on site but any such evidence may be buried under the considerable amount of fill in some parts of the quarry. The area is known as Lime Kiln Hill which strongly suggests that there were kilns nearby.

From Ordnance Survey evidence it would appear that the quarry was operational in the 1870s but had ceased excavation by the 1890s. The tunnels were most likely to have been dug around 1860-1870.

During the survey work in Swine Wood, it was found that the working of the open-cast chalk quarry had exposed the remnants of a small denehole. Only one chamber remained, the shaft and any other chambers had been quarried away. It is located in the north-west face of the quarry and the roof level is approximately 8.0m below the ground level. The surviving chamber is 7.2m long, 3.58m wide and 3.5m high with little evidence of roof falls.

Around 200m north of this partially destroyed example is the site of another denehole that had been observed by Bradshaw. He noted that a deep shaft had been filled in 1976 and was visible only as a slight depression in 1979.<sup>2</sup>

### *Lees Court Ice Well*

In June 2012 estate workers cleared in excess of 5 tonnes of rubbish from the large, well preserved, ice well associated with Lees Court. At the invitation of Lady Sondes, the writer and a small number of KURG members visited the site in April 2014.

The feature lies approximately 600m east of Lees Court Mansion and was constructed in a chalk bank. A fairly plain red brick facade with no architectural embellishments contains a north facing brick passage, 2.09m long and 1.0m wide by 2.0m high, which leads to a deep conical brick-lined well, 4.16m in diameter at the passage floor level and narrowing to 2.24m at the bottom. A brick dome surmounts the well and the depth from the top of the dome to the base of the well is 7.22m. The bottom of the well has a two-brick thick floor in the middle of which is an unlined sump 2.24m in diameter and 1.2m deep cut into the natural chalk. Two diametrically opposite slots in the brick floor were probably to mount a framework for a grill over the sump when the well was in use.

The entrance passage has two sets of slots set in the brickwork to house frames for two insulating doors. The inner set has been utilised to install a modern wooden frame supporting an iron access gate. The whole structure is covered by a thick layer of earth as insulation, although that over the front of the entrance passage has eroded away with time.

Although this is a quite large example, the ice well is of a fairly basic standard layout of a north-facing entrance passage leading directly to the ice storage area. It is likely to have been built from a design offered in the various garden magazines of the 19th century.

There is no obvious source of ice to supply the structure on the estate. Whilst there were a number of small ponds near the house they probably would have not been able to fill an ice well of this capacity. Whilst it is possible that compacted snow could have been utilised it is much more likely that imported ice from Norway or America was used. The first cargo of Norwegian ice arrived in London in May 1822 and by 1844 the UK was importing 300,000 tons of ice annually from Norway. The first ice from Wenham Lake near Salem in America arrived in Liverpool in July 1844 and was highly prized for its purity. In the latter half of the 19th century ice importers were boasting that they could deliver to any part of the country within a day.<sup>3</sup> It is more probable, therefore, that this example of a large domestic ice well was supplied by commercial ice traders rather than by locally collected ice and snow.

### Acknowledgements

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ROD LEGEAR

<sup>1</sup> Kent Underground Research Group Research Report 7 (1990), 18-1.

<sup>2</sup> Personal communication, 1979.

<sup>3</sup> S. Beamon and S. Roaf, 1990, *The Ice Houses of Britain*, Routledge, pp. 41-47



