

ARCHAEOLOGICAL ASSESSMENT REPORT

Brandon Bypass

A REPORT ON THE ARCHAEOLOGICAL ASSESSMENT, 2005
VERSION 2 (UPDATED MARCH 2005)

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© January 2005

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All Suffolk C.C. Archaeological Service unless otherwise stated.

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Leigh Driver Historical Researcher (Freelance)

Acknowledgements

This project was funded by Environment and Transport Department, Suffolk County Council and the archaeological work was specified and monitored by Jude Plouviez (Suffolk County Council Archaeological Service, Conservation Team).

The SMR search of Suffolk and digital mapping was carried out by John Duffy, the Norfolk SMR search was carried out by Edwin Rose, Norfolk Landscape Archaeology. The walkover survey was conducted by John Duffy and James Rolfe, both of Suffolk County Council Archaeological Service, Field Team. The historical survey was compiled by Leigh Driver. The aerial photographic survey was undertaken by Rog Palmer.

The project was directed by David Gill, and managed by John Newman, who also provided advice during the production of the report.

Summary

A preliminary desk-top assessment of the corridor for a proposed Brandon by-pass was undertaken; this was designed to provide a basis from which strategies for further archaeological work could be formed. This examined aerial photographs, documentary sources, Suffolk County Council SMR and surveys of the flint mining complexes south and east of Brandon. It also included a rapid walkover survey. The most important sites identified are the nationally important Lingheath post-medieval flint mines, but flint mining activity can be seen to be continuing beyond Lingheath and more work is necessary to establish the date, nature and extent of this. Two Scheduled Ancient Monuments, prehistoric Barrows lie within the survey area and more work would be necessary to establish whether these are isolated features or have other barrows or occupation features associated with them which are not immediately visible. The presence of a possible gallows site on the edge of Brandon and a warren bank on the Santon Downham/Brandon parish boundary provide evidence of activities peripheral to the medieval town which requires further investigation. A Roman site, now under trees, which has previously produced numerous finds also requires examination. Most of this further work needs to be in the field, primarily either geophysical survey or trial trenching.

SMR information

Date of fieldwork:	January 2005
Grid Reference:	TL 798 860
Funding body:	Environment and Transport Department, Suffolk County Council
Oasis reference	suffolkc1-6390

1 Introduction

- 1.1 An assessment was undertaken to establish the archaeological potential along the route of a proposed bypass to the east and south of Brandon, connecting to the A1065 north and south of the town (Figure 1). The brief for this assessment was prepared by Jude Plouviez (Suffolk County Council Archaeological Service, Conservation Team) and is included in this report (Appendix 1). This was designed as a preliminary evaluation of the archaeological potential in order to inform future strategies to deal with threats to the archaeology. The survey area covered an area of approximately 500ha within the counties of Norfolk and Suffolk. Three parishes were covered within this survey, Weeting with Broomhill (Norfolk), Santon Downham (Suffolk), and Brandon (Suffolk).
- 1.2 This assessment has included several forms of research including an aerial photographic search, an historical survey, a Sites and Monuments record search, and a walkover survey. The main focus of interest is the group of Post-medieval flint mines centred on the Lingheath area (BRD 066 and 095). This area of flint mining is a nationally important site and any evidence of prehistoric origins to this mining would also be of interest.
- 1.3 Other sites of importance are two Scheduled Ancient Monuments (SAM 31804, BRD 123 and 21436, STN 005) both of which are prehistoric barrows. One of the two barrows (BRD 123) is scheduled as a 'Bell Barrow' and is one of the largest of its type known in Britain.

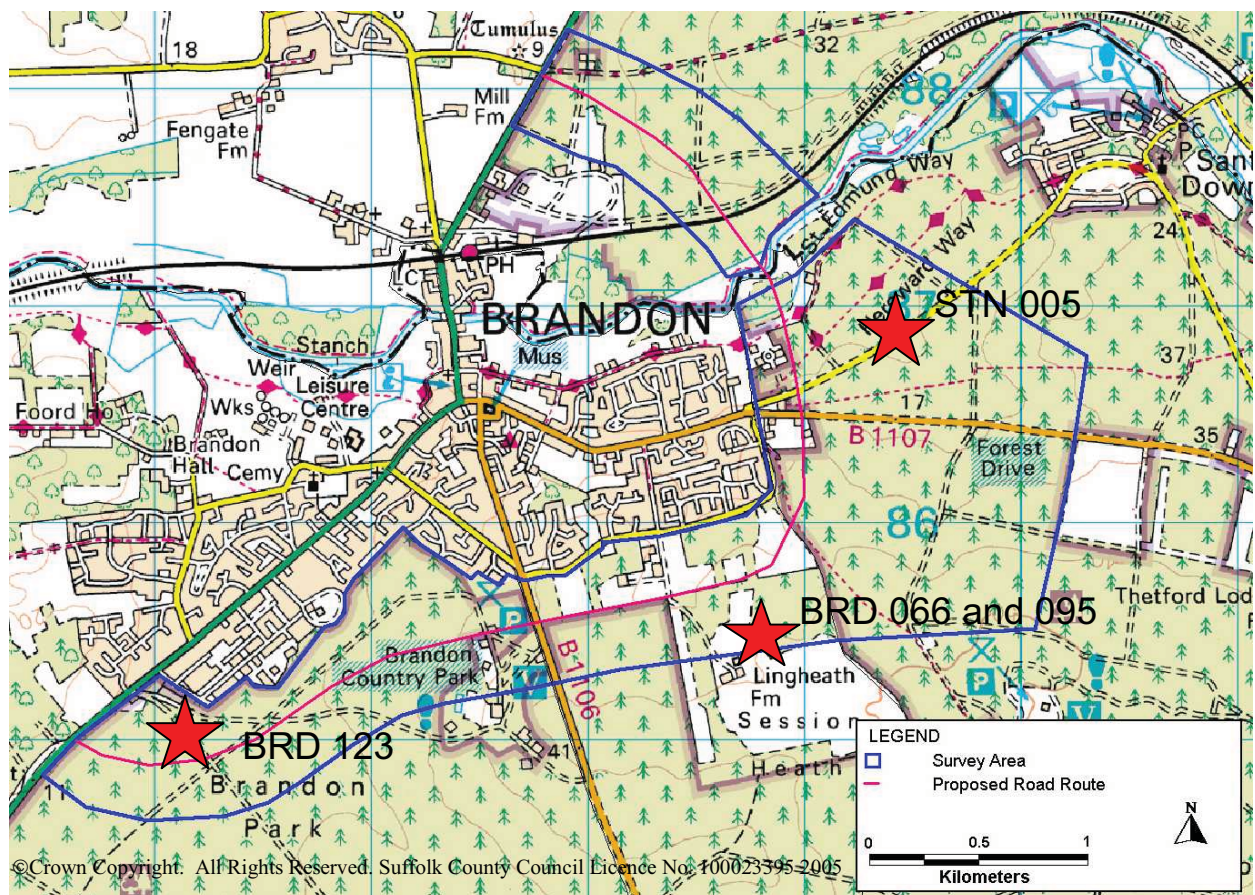


Figure 1. Survey location

2 Methodology

- 2.1 The aerial photographic search was undertaken by Rog Palmer (Air Photo Services) using cover searches obtained from Cambridge University Collection of Aerial Photographs (CUCAP) and the National Monuments Record: Air Photographs (NMRAP), Swindon. The full report is included as Appendix 2.
- 2.2 The historical survey was undertaken by Leigh Driver and the full report is included as Appendix 3. The survey looked at all historic maps and documents in the County Record Office, especially from the 19th century. The de Lotbiniere Collection was also consulted. The historic maps were then placed onto the modern OS map using MapInfo.
- 2.3 The Sites and Monuments Record (SMR) search was conducted using the Suffolk SMR database for Brandon and Santon Downham parishes. The results were then plotted onto the OS map using MapInfo. The scanned maps from the pre-digital Suffolk SMR was also consulted. A search of the Norfolk SMR was undertaken by Edwin Rose (Norfolk Landscape Archaeology), for the parish of Weeting with Broomhill and again the results were plotted onto the OS map using MapInfo. The results of the SMR searches are summarised in Appendices 4, 5 and 6.
- 2.4 The walkover survey was conducted by a two man team over three days. Earthworks were identified, where access permitted, and their location recorded using a basic handheld GPS (Global Positioning System) unit. Previously identified sites in the SMR were also visited as part of the survey and a general land use record was made. Where identified, new sites (Suffolk only) were given new SMR numbers and these were marked on the plans (but are not included in the SMR summaries at Appendices 5 and 6). The new sites codes are BRD 175 to BRD 182 and STN 073 to STN 079.
- 2.5 All maps, finds spots, pictures and aerial photographs are digitally recorded and accessible if required.

3 Aerial photographic survey by Rog Palmer (Air Photo Services)

This is an extract from the full Aerial Photographic Survey which can be found at Appendix 2.

3.1 Soils

The Soil Survey of England and Wales (SSEW 1983) shows the area to have pockets of chalky drift (soil association 521: METHWOLD) within a larger expanse of glaciofluvial drift (soil associations 551g: NEWPORT 4 and 554b: WORLINGTON). The Soil Survey Legend noted that 554b sometimes shows 'widespread small-scale polygonal soil patterns' in crops which may react similarly to sub-surface archaeological features.

3.2 Possible archaeological features

No definite archaeological features were identified on the photographs examined but three groups of possible features have been included on the map (Figure 2).

- 3.2.1 **TL793858.** A small area of parallel ridges. These were suspect as archaeological and may be of natural origin. Similar 'stripes' were noted in the wider area, some of which are now under recently-built houses.
- 3.2.2 **Area centred TL798852.** A large number of small pits survived in earthwork form between 1946 and 1959 (see photograph in Figure 2 and Figures 11 and 12 in Appendix 2) but had been ploughed by 1971. Each pit had an associated bank (?of spoil) that usually had been formed in a horseshoe shape, as if access was by means of the unbanked part. In places their distributions seems to be unplanned while in other parts they appear to form lines. Both include examples where banks are superimposed, suggesting that the working of the pits was spread over at least a small time span.

Brandon Bypass,
Suffolk:

Figure Features
identified on aerial
photographs

- Area examined
- Hollows
- Ridges
- Quarried 1971

The photograph shows
possible flint mines (1959).
See Figures 2 and 3.

Original photo interpretation
and mapping at 1:2500 level
based on photographs at
CUCAP and NMRC.
Air Photo Services Cambridge
November 2004
Drawing: 0430Bran.dwg

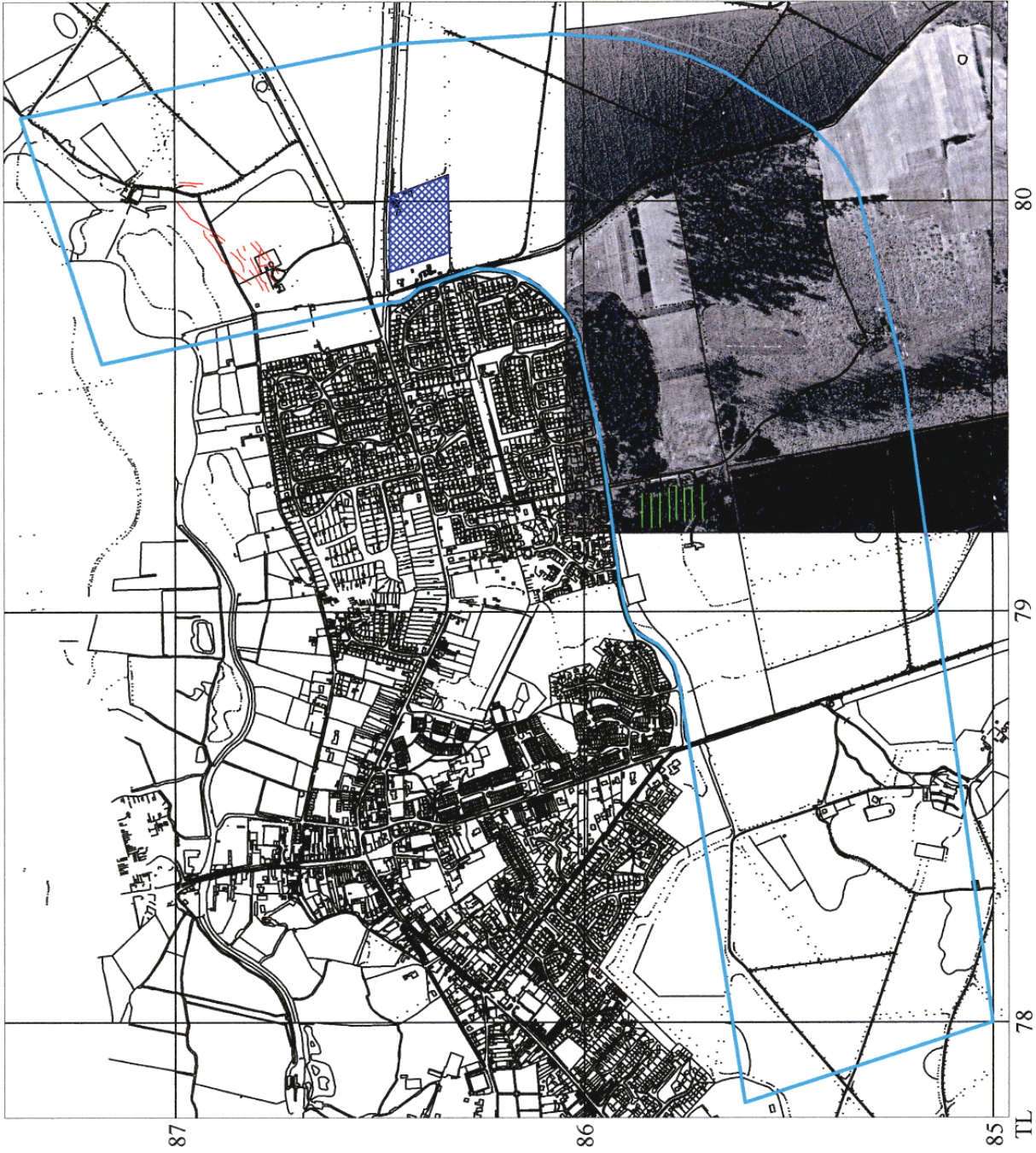


Figure 2 Features identified on Aerial Photographs

Their origin and purpose is unknown as is the reason for their survival in upstanding form in the 1940s in an area that otherwise seems to be intensively farmed or wooded. Judging by the small and regular amount of spoil the pits seem unlikely to be very deep but, if they are contenders for flint mines, they may be seeking material close to the surface. But if that was the case it would seem more efficient to clear a larger area rather than dig a series of small pits. An alternative explanation may link them with forestry, but this seems even less likely.

Figures 11 and 12 (in Appendix 2) are both transformed photographs that show the area in June 1946 and January 1959. At first glance it appears that there are more pits in 1959 but this seems likely to be an effect of the low winter sunlight and its ability to enhance the appearance of slight earthwork features. Both photographs show what look like plough-levelled examples of pits at TL794857, just south-west of the small wood and north of the main group of pits. Other levelled pits may remain unrecorded on the photographs examined.

- 3.2.4 **TL798868.** A spread of hollowed features were photographed in January 1947. These may indicate former paths but may be less structured examples of the ridges noted at TL793858.

3.3 Non-archaeological features

- 3.3.1 **TL798870.** A small number of loosely-scattered trees were noted in this area. These had been removed by the time the area was photographed on military obliques in 1953, which showed the tree positions as small pits that might be thought to be of archaeological significance if these photographs are examined in isolation.

- 3.3.2 **TL799864.** One small field was a quarry in 1971.

3.4 Land use

- 3.4.1 The area has a high percentage of woodland with small arable fields. This mixture may have discouraged any airborne archaeologist from close examination of the ground and past features may be under-represented as a result.

4 Historical survey summary by Leigh Driver

This is an extract from the full Historical Survey Report which can be found at Appendix 3.

- 4.1 A report by the Royal Commission on the Historical Monuments of England (RCHME), published in 1996, argues that while Sydney Skertchly's assertion that Brandon was an "outlier of the stone age" (1879, 69) might be described as "fanciful", the notion that flint could have been taken from the area in Neolithic times should not be discounted; "since it shares a common geology with Grime's Graves and any Neolithic workings could have been subsumed by those of later date" (Pearson 1996, 3). Support for a likely Neolithic presence can be found in the Suffolk County Council Sites and Monuments record for Brandon Parish, which notes several surface scatters of worked Neolithic flints. Just outside the corridor of land under consideration in this report, locations with names such as White Hill Plantation and The Mount suggest the presence of possible prehistoric monuments while numerous, though as yet largely undated, earthworks e.g. BRD 106 Mount Plantation SF15369 Round Barrow - located in Mount Plantation to the west of Lingheath Farm (TL79298498), attest to a long history of human activity in the area.

- 4.2 Evidence of early activity may have been ploughed out of existence in the more heavily cultivated areas of the parish, while on the poorer ground, once barren heathland suitable only for the rearing of sheep and rabbits, devastating sand blows such as that recorded in 1668, which choked the River Little Ouse and buried houses at nearby Santon Downham (SRO HD 1321/2), could conceivably have covered all traces of both pre-historic and post-medieval flint extraction; as the partly covered Neolithic mining site at Buckenham Toft, Norfolk (an outlier of Grime's Graves), clearly demonstrates (Barber *et al* 1999, 27-28).
- 4.3 In addition the steady expansion of the busy market town of Brandon, not to mention centuries of quarrying activity within the parish for chalk and gravel, as well as the extensive early 19th century forest plantations of the Brandon Park Estate, followed a century later by those of the Forestry Commission (since 1922), may all have played a part in obscuring whatever sites might once have existed on the flint-rich chalk belt upon which the town was built (Barber *et al.* 1999, 31, 33; Forrest 1983, 6).
- 4.4 For this reason, the partially preserved complex of post-medieval flint mines to be found at Lingheath Farm, Brandon, (a section of which falls within the designated area of study) is of immense interest and historical importance, being a rare relic of a now vanished industry. Close by, scattered clusters of pits have been discovered, possibly also flint-mines, some of which may pre-date the Lingheath complex, and which lie on both sides of the parish boundary with neighbouring Santon Downham; although only a full survey will be able to determine the age and extent of such workings (trees and undergrowth permitting).
- 4.5 Considered together with its proximity to Grime's Graves, the largest known complex of prehistoric flint mines in Britain, less than 3 miles (5km) to the north (Forrest 1983, 2), and with the possibility of Neolithic activity at Icklingham 12 miles (19km) to the south (Forrest, 1983, 97), which, like Brandon, was the site of 19th-century flint extraction for the production of gunflints, it is clear that a wide area, but particularly that to the north of Lingheath Farm and the stretch of woodland between Lingheath and the River Little Ouse at Santon Downham, will require further, extensive examination. For, although a great deal is known about Brandon's long dominance of the industry through the production of its world-famous 'Brandon Black' gunflints, surprisingly little information is available regarding the origins and development of the various workings from which the raw material was extracted.

5 Summary of Previous Recent Surveys

There have been several extensive surveys of the flint mining areas carried out in the last ten years. (An earlier report by Skertchly in 1879 is mentioned in the documentary study). The current survey area falls into only a small part of these surveys.

5.1 Flint Mines: Rapid Survey

- 5.1.1 A rapid survey of the flint mining areas within Brandon, Santon Downham and Wangford was carried out by Colin Pendleton (SCC SMR Officer) in 1996. This work in conjunction with earlier surveys (RCHM and Breckland Archaeological Survey) has identified 4 main types of mine earthwork, horseshoe, large circular, small circular and gully. The survey area was examined in forest blocks, the mine type present recorded and the preservation and apparent density graded.

- 5.1.2 The initial results of this survey showed up to ten separate areas of mining in the Brandon and Santon Downham areas, five of which, STN 32/39, STN 30, STN 38/18, BRD 095 (Lingheath) and BRD 095 west of Lingheath lie within the current survey area. Although some areas were levelled most of these were observed to survive as visible earthworks to some degree, eg. part of BRD 095 Lingheath, STN 018/38, STN 030 and STN 032. The exact boundaries of these areas are not certain although it is presumed that these relate to property or land boundaries.
- 5.1.3 The survey showed that both a mixture of mine types and single type sites were present. It was not determined whether the variation in mine type was chronological but suggests that the horseshoe type is the latest, up to the 1930's. It also raises the possibility that the variation in mine type may reflect different minerals being mined alongside, or instead of flint. These are all important issues that require further investigation.

5.2 RCHME Survey of Lingheath Farm

- 5.2.1 A survey of Lingheath Farm was carried out by Trevor Pearson and Alastair Oswald for RCHME in 1996. This recorded a brief history of the Brandon post-medieval flint mining industry and the history of the site. Much of the area was heathland or forest where mines survived as earthworks until WWII since when c.22ha of pits have been levelled as land was brought into cultivation. Earthworks still survive in the unploughed areas but no remains could be seen in the agricultural areas, although they are recorded prior to levelling on mid 20th century aerial photographs. Anecdotal evidence records accessible shafts being entered by various groups and backfilled shafts have been known to subside under the ploughed fields.
- 5.2.2 An area west of the farm is no longer visible as it has been obscured by soil dumps and building debris but examination of the surviving visible areas shows variations in the distribution and appearance of the pits. To the north-west there are circular or semi-circular, tightly packed but randomly placed hollows c.5m across and 0.5m deep and to the south and east there are horseshoe shaped spoil heaps accompanying more widely spaced pits, laid out in east-west and north-south rows with the spoil heaps surviving to a height of 0.5-1m.
- 5.2.3 This survey records detailed description of the pits by area as well as other earthworks comprising boundary banks, linear hollows and routeways. It establishes that the boundaries of the Lingheath Trust allotments (1791 shown on Figure 7) are marked by banks which are post-dated by the mines. No pre enclosure mines were identified although they could exist if contained entirely within the enclosed areas.
- 5.2.4 RCHME survey areas 3 and 4 lie within the current survey area. Area 3 contains some of the best preserved earthworks at Lingheath, including shallow linear hollows and an apparently unstructured layout to the pits. Area 4 has circular or semi-circular shafts but with three pits with horseshoe shaped spoil heaps. The pits are not laid out in a regular pattern and the area contains a range of surviving chronological evidence. Both these of these areas represent important samples of the mining complex and identify the significance of the areas lying within the proposed road corridor.

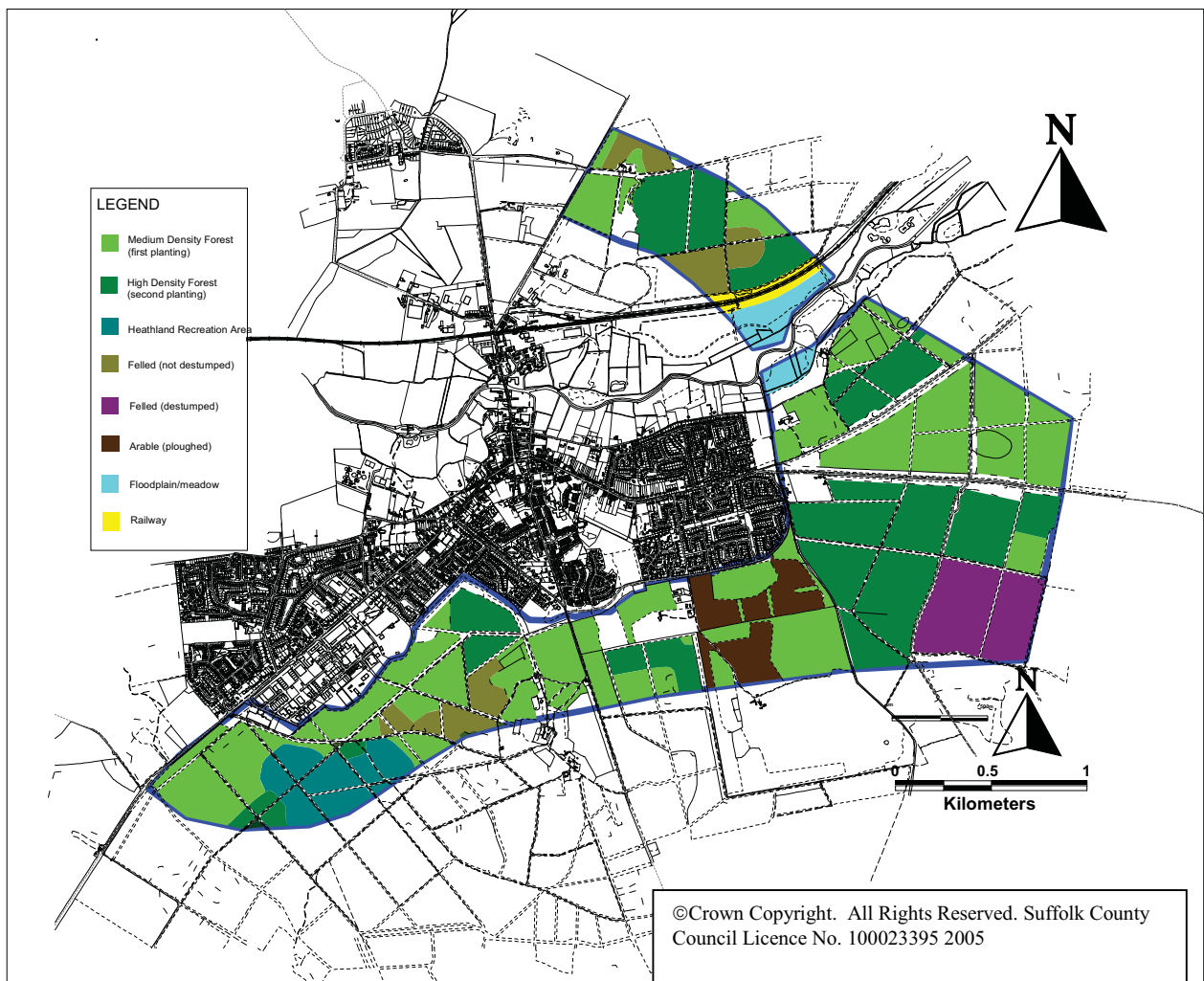
5.3 SCCAS Forest Surveys.

SCCAS have been carrying out systematic surveys of forestry land in Suffolk and South Norfolk since 1998 working with the Forestry Commission to identify potential surviving

earthworks prior to destumping and replanting work. However to date none of the current survey area has been routinely covered during this work

6 Sites and Monuments Record search and walkover survey

6.1 The results of the walkover survey and the SMR search are presented here. However, it must be noted that the walkover survey was very coarse due to low visibility and accessibility as a result of modern land use and the limited time available. The results are by no means a comprehensive survey of the surviving earthworks within the area of the survey. There are also substantial areas where the ground has been flattened (through forest replanting and ploughing). As part of the walkover survey a simple plot of the present land use was drawn indicating areas where earthworks would no longer be visible (Figure 3). The results are presented by parish.



Some of the areas marked have been previously subject to de-stumping, which will impact on the potential survival of earthworks. Maps showing these areas are held by the Forestry Commission, but have not been consulted during this assessment.

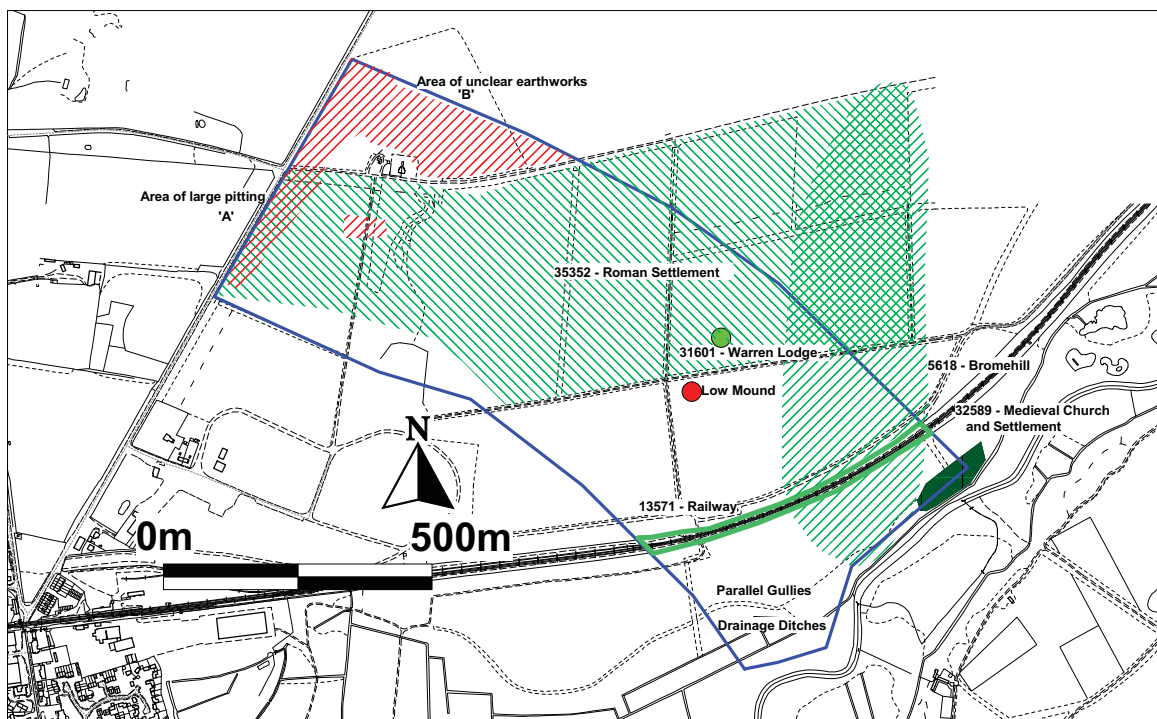
Figure 3. Current land use

6.2 Weeting with Broomhill, Norfolk (Figure 4)

6.2.1 A small area within the parish of Weeting with Broomhill, Norfolk was included in the survey. This extended from the A1065 north of Brandon to the river on the east of the town. For this area both a SMR search and a walkover survey were conducted.

Approximately fifty percent of the survey area had the potential for preserved earthworks with areas of first generation pine trees, open felled areas, and meadow/floodplain.

- 6.2.2 Along the A1065 at the northern limit of the survey area a series of very large pits were identified (see 'A' on Figure 4). The pits measured up to fifty metres across and in places were up to three metres deep. The group extended along most of the length of the A1065 within the survey area. The function of these pits was unclear, though their use as extraction pits is likely. If this is the case then the number and size of the pits indicate work on a fairly large scale. The date of these pits may be post-medieval but could be evidence of more recent activity.
- 6.2.3 Further earthworks were identified to the east of the pits though these were fairly ambiguous and it is unclear if these were even archaeological, let alone associated with the pits (see 'B' on Figure 4).



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Key to Map

Green hatching, circle and line are sites known from the existing SMR

Red hatching and circle are new observations from walkover survey

Figure 4. Weeting with Broomhill SMR and walkover survey results

- 6.2.4 There were no visible earthworks for the Roman settlement identified in the SMR search (35352) though the area was still under its first generation of trees. The site has previously been identified by fieldwalking and the high quantity of finds suggests good archaeological potential on this site. The date range of the finds is also wide, suggesting activity on the site from the prehistoric period onwards.
- 6.2.5 Identified as the possible site of Bromehill Warren Lodge (31601) from the 1791 Cadogan Estate map. No visible earthworks survive for this site though the area has not been flattened. Only further work (geophysical survey or excavation) would be able to determine whether this was the location of the lodge.

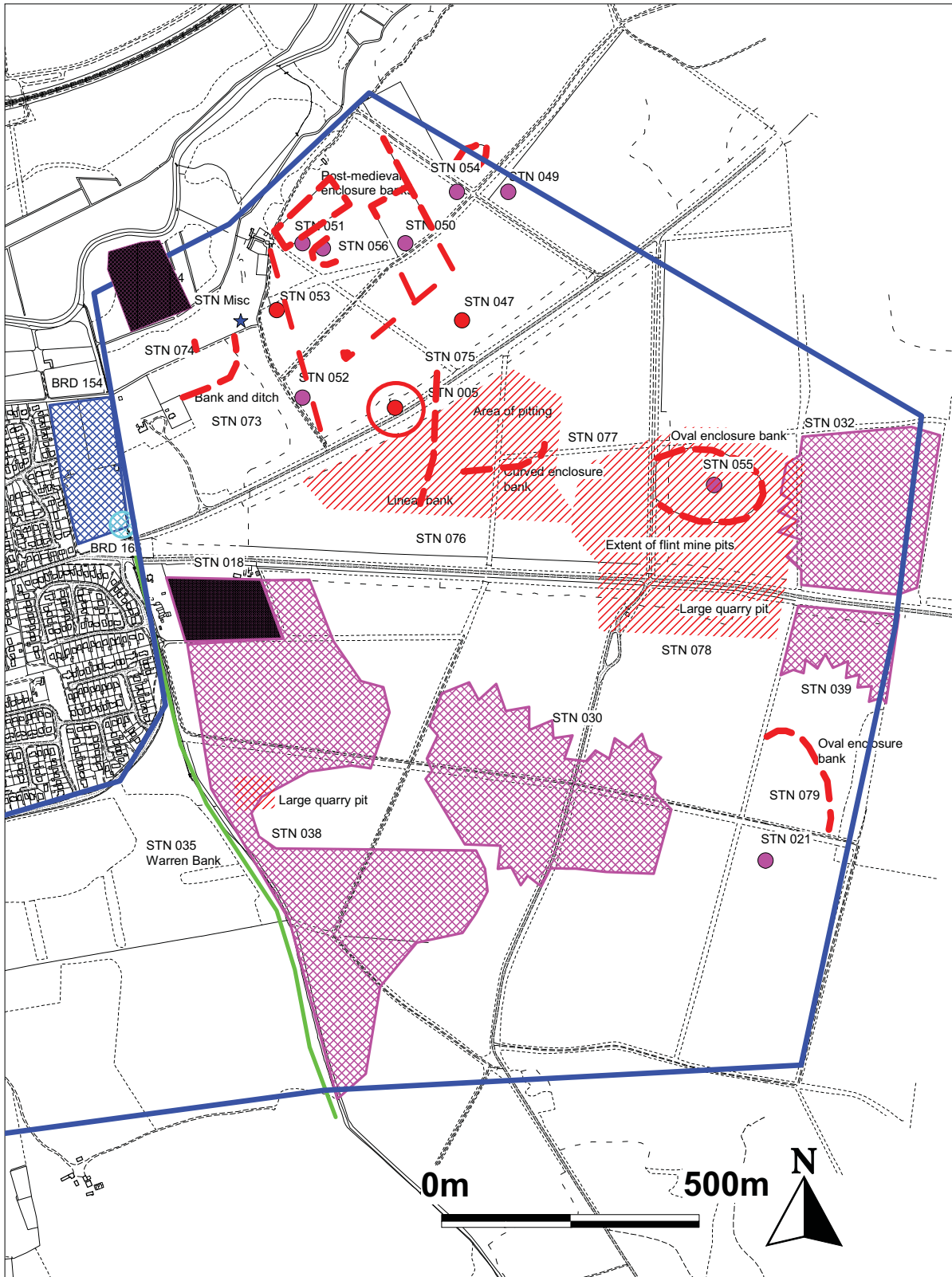
- 6.2.6 To the south of the possible lodge site a low mound was identified measuring approximately five metres across. The function and date of this mound is unclear.
- 6.2.7 The railway line from Brandon to Norwich runs further to the south. This is part of the historic Norfolk railway system which includes listed buildings. Only the track runs through the survey area with no associated buildings or workings of historic importance.
- 6.2.8 Two parallel gullies were located to the south of the railway and are marked on the modern OS map. These gullies appear to be either side of a trackway running parallel to the river. The date is uncertain though probably post-medieval. This trackway may have functioned as access to the meadow land within the floodplain of the river. This area is characterised by a series of drainage ditches still visible on modern OS maps, also possibly post-medieval in date. These drainage channels are indicators of land management along the river floodplain.

Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
13571		Pmed	Railway line, opened 1844. Listed buildings along its course.	Still in use.	
5618	TL 7970 8760	Mixed	IA and Roman pottery, LSax strap end found metal detecting.		
35352	TL 7960 8790	Roman	Roman settlement identified from extensive finds spreads recovered during fieldwalking and metal detecting.	Under first generation of trees.	Potential for intensive 'fen-edge' type settlement
31601	TL 7960 8775	Pmed	Bromehill warren lodge, possible site marked on 1791 Cadogan map	No visible earthworks, but not levelled.	

Table 1 Summary of results of SMR search (excluding 'misc' sites) and new observations.

6.3 Santon Downham, Suffolk (Figure 5)

- 6.3.1 Less than fifty per cent of the survey area had the potential for surviving earthworks, the rest had been flattened during the replanting process. However, in many of these areas some survey had already been conducted and recorded in the SMR.
- 6.3.2. The area immediately south of the river is similar to that on the north with a network of drainage ditches still visible on the modern OS map. Again the date for these ditches is unclear. This area also contained evidence for a floated water meadow, STN 024, which may give a picture of land use and management of the river floodplain.
- 6.3.3 Located to the south of STN 024 and on the edge of the floodplain, is an area of earthworks, STN 074. Although the earthworks are clearly visible on the ground it is impossible to discern their form or assess whether or not they are archaeological. Slightly further to the south a large curvilinear bank, STN 073, and ditch were identified along with other less distinguishable earthworks including a low wide bank. The date and function of these features are unclear, though they may relate to features visible on the 1880 County map (Figure 6).



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Key to Map

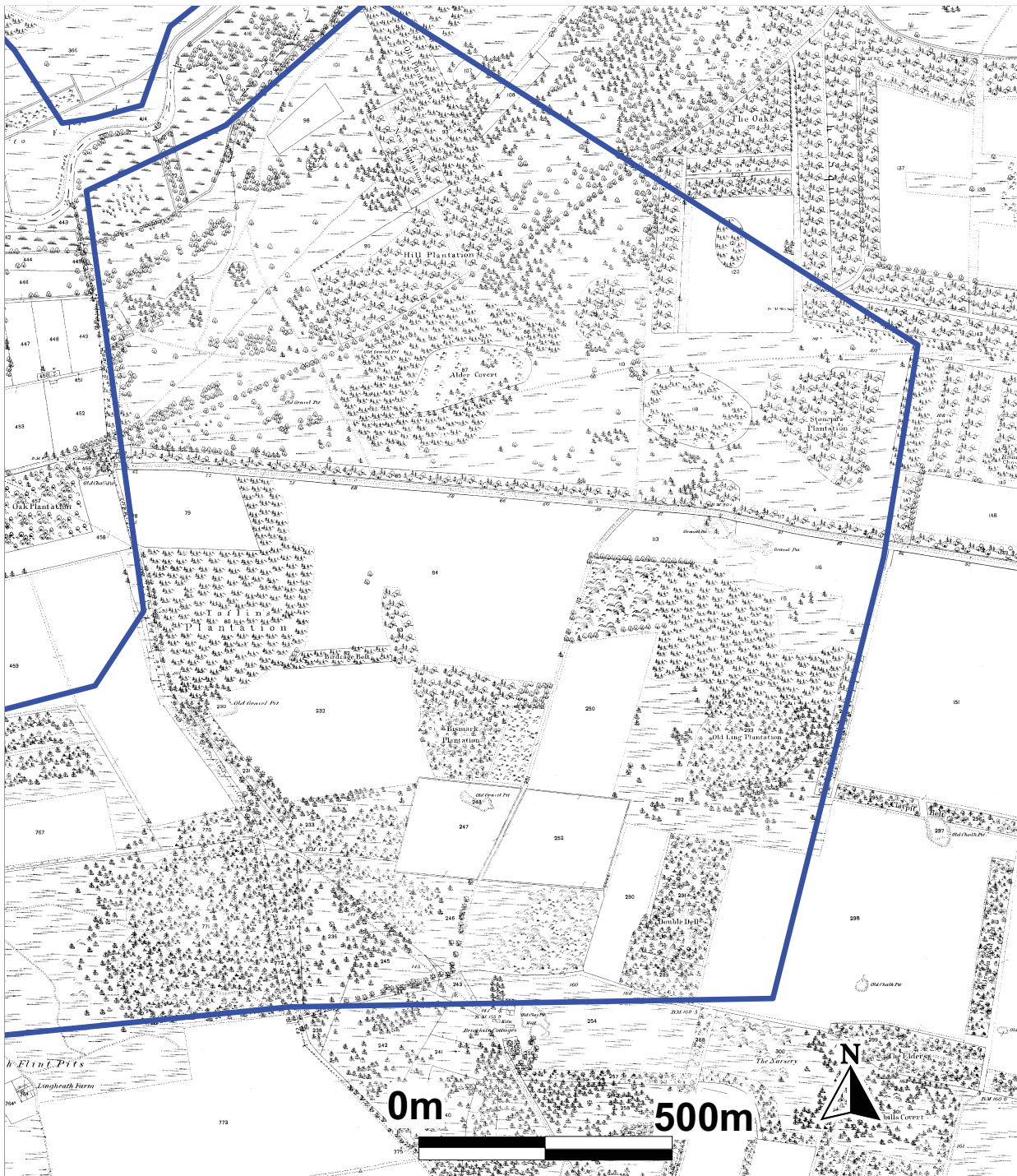
Cross hatching = extent of sites from SMR

Hatching = new observations from walkover survey

Figure 5. Santon Downham SMR and walkover survey results

- 6.3.4 Sites BRD 154 and 165, although just outside the survey area, have shown the presence of activity on the eastern edge of Brandon. An excavation at BRD 154 indicated Late Bronze Age occupation of the area, with some finds dating to the Neolithic (Gibson et al, 2004). Post-medieval finds and features were also present and it is possible that further activity relating to this may continue into the survey area. At BRD 165 the remains of three inhumations were excavated; these were radiocarbon dated to 1150-1270AD (68% probability, GU-11459) and it is postulated that lying on the parish boundary, away from a church and north-south aligned these may represent burials from a nearby gallows site (Tester 2004). It is therefore possible that further burials may continue east into the survey area.
- 6.3.5 STN 053 is a long low mound approximately eighty metres by twenty metres, and is overlain by bank STN 052. Both features were identified in 1996 after felling, but ahead of de-stumping of the area. At present the two features are difficult to see as the area has been generally flattened for replanting. STN 053 appears to still survive though STN 052 was not visible during the walkover survey. These features are undated, but probably relate to other post-medieval activity in the vicinity.
- 6.3.6 Further to the east a series of post-medieval earthworks survive. These include two oval plantations, STN 054 and 056 and a series of linear banks and enclosures, STN 049, 050 and 051. These banks and enclosures are visible on the 1880 County map and relate to features on the Cadogan Estate Map from 1791 (Figure 7). During the walkover survey all of these sites were visited and all have surviving earthworks.
- 6.3.7 STN 047 is recorded as a 25-30m wide mound and possible round barrow. During the walkover survey this area was inaccessible due to the density of young pine trees. It was also noted that the area had been flattened but it is unknown whether the mound has survived.
- 6.3.8 To the south-west of STN 047 another barrow, STN 005 survives as a clearly visible mound, approximately 18m wide and 1m high, with a surrounding ditch. This is a Scheduled Ancient Monument (SAM 21436).
- 6.3.9 Located to the east of STN 005, and extending to the south across the road, is a long low bank with ditches on both sides, STN 075. The total length of the bank is approximately 250m, with a width of 1-2m. The function and date of this bank are unknown.
- 6.3.10 Located further to the east is a large group of pits (at least 20) STN 076. These pits vary in depth from very shallow to over 0.5m, some reach a width of up to 10m. Alongside these pits is a wide, linear hollow way running north-east south-west which then forks at its western end with one hollow carrying on its original course and one heading south. This pit group and hollow ways appear to form a small mining or extraction complex probably of a post-medieval date.
- 6.3.11 A curvilinear bank, STN 077, was located to the south of this complex which appears to relate to an oval enclosure visible on the 1880 County map. Another oval enclosure, STN 055, is visible to the east which survives as a 2m wide bank, and a similar sized outer ditch.
- 6.3.12 Large groups of post-medieval features suggestive of flint mining, STN 032 and 039, were located to the south and east of STN 055. These sites consist of large numbers of pits and trackways indicating a fairly extensive industrial site. During the walkover

survey STN 032 was visited and surviving earthworks were recorded. An attempt was made to locate the western edge of the site and pits were found to extend at least 350 to 400m to the west, though becoming more dispersed further west. Site STN 039 is now no longer visible as earthworks as the area has been levelled and replanted. The area to the west of STN 039 has also been levelled and no earthworks are visible except for a large quarry pit alongside the main road. This quarry pit, STN 039 and STN 032 all appear to be part of one large post-medieval industrial complex, probably for flint mining.



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Figure 6. 1880 County map for Santon Downham



Figure 7. Cadogan Estate Map 1791

6.3.13 A section of curvilinear bank, STN 079, was identified to the south of STN 039, however, its extent was unknown as it continued to the west and south into flattened and replanted areas. This bank corresponds to an oval enclosure visible on the 1880 County map and may well be associated with STN 021 which is defined as an area of “Old gun flint industries” by Rainbird Clarke on the 6 inch record map. Apart from the section of bank most of the area had recently been de-stumped, flattened and replanted.

6.3.14 The majority of the south-west corner of the Santon Downham survey area is covered by three sites, STN 018, 030 and 038. These are a series of post-medieval industrial sites focused largely around the flint mining industry of the 19th century. These sites appear to continue into Brandon parish as the well known post-medieval flint mining site of Lingheath. STN038 has evidence of chalk spoil in aerial photographs and knapped flint was recovered during a rapid field survey by Colin Pendleton in 1996 (Pendleton 1996). STN 018 comprises small vertical shafts with ‘pick’ marks in the chalk, these were originally reported as antler pick marks but a visit by SCC identified them as probably post-medieval tool marks. During the walkover survey only one large quarry pit was identified within the area of STN 038, no other earthworks were visible as the area has been flattened and replanted and part of it is a modern chalk quarry (STN 018).

6.3.15 The western boundary bank, STN 035, of the Downham Warren runs north-south along the Brandon-Santon Downham parish boundary in the survey area. This survives intermittently as an earthwork bank around the western, southern and eastern edges of the warren, beyond the survey area. South of Lingheath the exact course of it is unknown but it is still visible along the west edge of the STN 018 and 038 mining complexes.

Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
STN 005	TL 8028 8680	Undated	Round barrow by the side of the road, in woodland..	Still visible c. 18m in diameter x 1m high	SAM 21436
STN 018	TL 7994 8648	Pmed	Flint workings consisting of small vertical shafts seen in chalk quarry face, with probably post-medieval pick marks on the walls of the shaft.	No earthworks visible, forested and chalk quarry.	
STN 021	TL 8100 8589	Pmed	Area of ‘old gun flint’ industries defined by Rainbird Clarke on 6 inch record map.	No earthworks surviving	
STN 024	TL 7980 8700	Pmed	Straight ‘ridge and furrow’ like earthworks, identified as probable floated water meadow, similar to those at Lynford and West Tofts	Still visible	
STN 030	TL 8056 8604	Pmed	Large area of chalk and worked flint expose on cleared surface beside forest track. Probable flint workings. Includes bank on west side.	Medium to high density woodland. No earthworks visible, area flattened and replanted	
STN 032	TL 8110 8650	Pmed	Extensive area of pits and spoil visible in woodland in 1993 with earthwork bank and ditch on north edge.	Medium to high density woodland. No earthworks visible, area flattened and replanted	
STN 035	TL 7990 8590	Pmed	Part of the Downham warren boundary, a bank surviving intermittently around the west south and east sides of the warren.	Earthworks still visible in places.	

Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
STN 038	TL 8000 8590	Pmed	Flint mine complex, extending to Lingheath and may extend to STN 030. Rapid survey in 1996 revealed knapped and quartered flint.	One large quarry pit visible, otherwise, medium to high density woodland. No earthworks visible, area flattened and replanted	
STN 039	TL 8110 8630	Pmed	Further area of flint mines, possibly linked with STN 030 and STN 032 (and also with STN 031, knapping waste). Part west of forest track survived as visible pits in 1996, but part flattened by levelling and planting.	Both areas now levelled and flattened, no earthworks visible, except for one large quarry pit, alongside the main road.	
STN 047	TL 8041 8695	Undated	Possible round barrow, in area of STN 005 but also of natural sand hummocks. 25-30m across.	Inaccessible, due to density of young trees, but area generally flattened. Survival of the earthwork is unknown	
STN 049	TL 8050 8720	Pmed	Long earthwork bank which connects to STN 050.	Earthworks surviving.	
STN 050	TL 8030 8710	Pmed	Series of banks in rectilinear layout, linked to STN 049 and probably 051 and 052.	Earthworks surviving	
STN 051	TL 8010 8710	Pmed	Rectilinear block of earthwork banks, probably defining a plantation.	Earthworks surviving	
STN 052	TL 8010 8680	Pmed	Slight linear earthwork visible in cleared forestry in 1996. Part of STN 050 etc, group.	Not visible within the trees now, levelled and planted	
STN 053	TL 8005 8697	Pmed	Long low mound c. 80m x 20m defined by visible ditches. Overlain by bank 052.	Earthworks still visible.	
STN 054	TL 8040 8720	Pmed	Oval enclosure bank defining plantation shown on OS maps of 1824.	Earthworks still visible	
STN 055	TL 8090 8663	Pmed	Large oval plantation defined by mostly surviving outer banks	Survives as 2m wide bank and similar sized ditch.	
STN 056	TL 8014 8709	Pmed	Oval enclosure defining small plantation, shown on OS 1928 map.	Earthworks visible.	
STN 073	TL 7995 8688	Undated	Large curvilinear bank and ditch identified during walkover survey amongst other less well defined earthworks	Earth works visible	New observation
STN 074	TL 7988 8691	Undated	Clearly visible earthworks in floodplain, however difficult to define or confirm that these are really archaeological.	Earth works visible	New observation
STN 075	TL 8036 8671	Undated	Linear bank running north-south on east side of STN 005	Earth works visible	New observation
STN 076	TL 8042 8670	Pmed?	Large group of pits, at least 20, up to 10m wide and 0.5m deep. Also includes a forked Hollow Way. Probably relates to flint mining.	Earth works visible	New observation

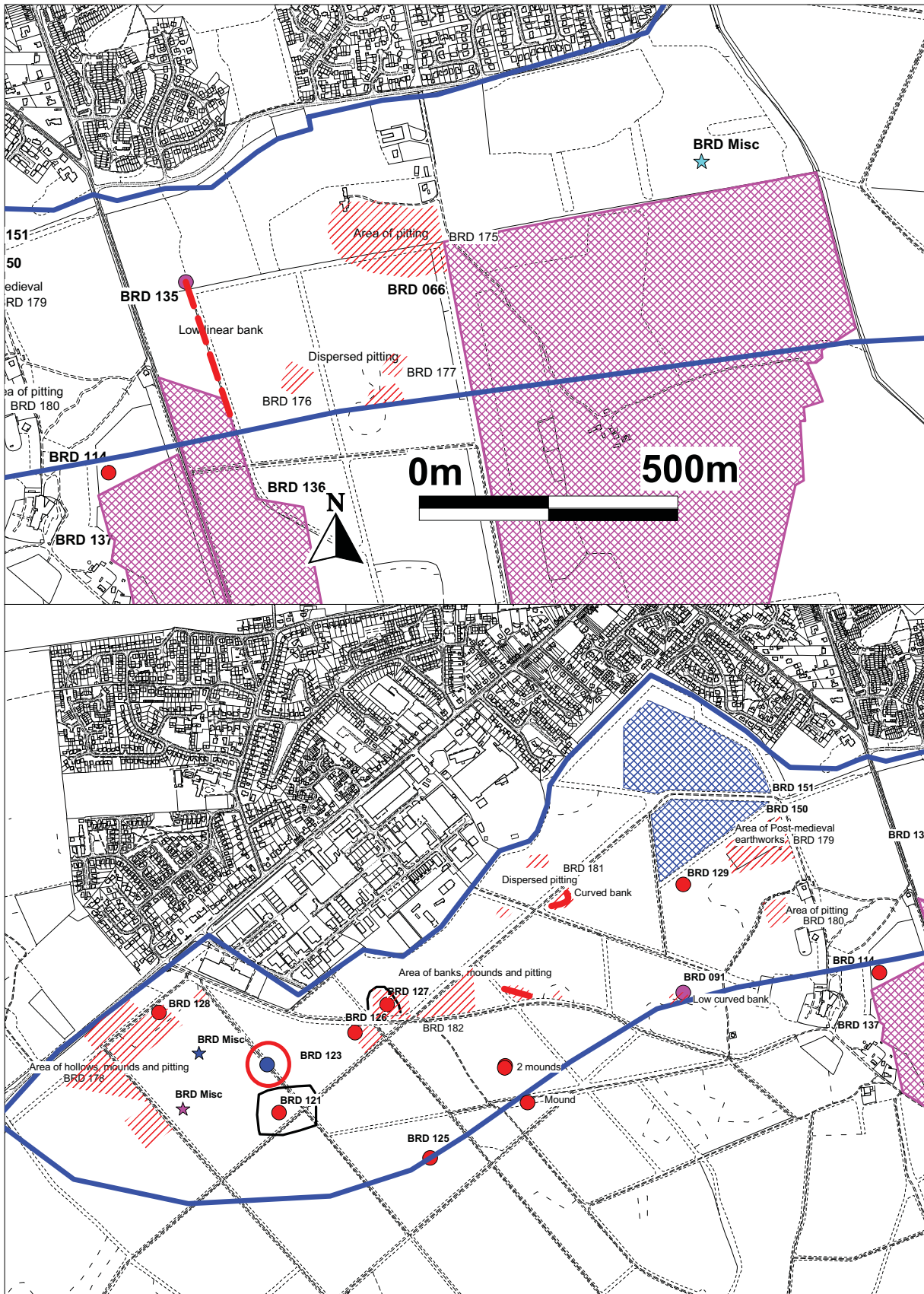
Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
STN 077	TL 8052 8670	Pmed?	Curvilinear bank which appears to relate to an enclosure on the 19 th century OS map	Earth works visible	New observation
STN 078	TL 8087 8649	Pmed	Extension to already marked flint mining areas of STN 032 and 039. Extends c. 350-400m west of limits of STN 032/039 although becoming more dispersed to the west.	Earth works visible	New observation
STN 079	TL 8111 8610	Pmed?	Oval enclosure bank north of STN 021. Corresponds with enclosure on 19 th century OS map and probably relates to STN 021 flint mines.	Earth works visible	New observation

Table 2 Summary of results of SMR search (excluding ‘misc’ sites) and new observations.

6.4 Brandon, Suffolk (Figure 8)

- 6.4.1 Approximately 70 per cent of the area surveyed within Brandon parish had the potential for surviving earthworks. Modern land use varied considerably across the area including ploughing, first planting pine trees, new planting pine trees, felled areas not yet destumped, cleared areas, and a heathland recreation site. The Brandon parish survey area is easily split into two general areas to the east and west of the B1106 to Bury St Edmunds.
- 6.4.2 To the east of the B1106 the recorded archaeology is dominated by the post-medieval flint mining industry. However, there are some industrial areas located on the western side of the B1106, BRD 137.
- 6.4.3 The main focus of the flint mining area is that of Lingheath, BRD 066 and 095. This area has been subject to some previous work (RCHM in 1996, see Appendix 3, and Sussams, 1996). This site is well served in both historical and cartographic evidence. A limited survey of the area has also been undertaken (RCHM) giving detailed earthwork surveys of limited areas of Lingheath. Air photographs also provide good evidence of the Lingheath area providing clear images of the extent and density of the mining. However, at present large areas of Lingheath are now arable and as such the earthworks are no longer visible except in the limited areas of surviving woodland.
- 6.4.4 During the walkover survey several pits, BRD 175, were identified to the north west of the defined Lingheath site suggesting a continuation in that direction. However, there is no clear link to the identified sites, BRD 135 and 136, to the west with only scattered hollows visible in the forest, BRD 176 and BRD 177. Both the linear bank, BRD 135, and the area of flint mine hollows and associated gullies were still visible. There was also no visible extension to the flint mine site immediately to the west of the B1106, BRD 137.
- 6.4.5 To the west of the B1106, Brandon Country Park, the archaeological landscape appears different with the notable absence of post-medieval flint mining and extraction sites.
- 6.4.6 A 17m diameter mound, BRD 114, on the southern edge of the Brandon parish survey area has been identified and appears to be related to the 19th century Brandon Park House. Several other features appear connected to the house including the clearly visible

- road line extending from the A1065, BRD 120, and various enclosures, BRD 091, of which at least part of one was identified during the walkover survey. A small group of fairly large (15-20m) irregular pits were also identified, BRD 180. These were located to the north-east of BRD 091 and again may well be associated with Brandon Park House.
- 6.4.7 Located to the north west of Brandon Park House were a series of features, BRD 129, including a linear bank, circular bank and trackway associated with 'The Cottage' on the 1905 OS map. A rectangular enclosure, BRD 179, still marked on the modern OS map and still partially visible on the ground, may well be also associated with these features.
- 6.4.8 Two areas, BRD 151 and 150, are identified in the SMR as having been fieldwalked ahead of new planting. This fieldwalking recovered over one hundred worked and burnt flints of a late prehistoric date. This area is now inaccessible due to dense forest.
- 6.4.9 Located to the south west of BRD 150 and 151 is an area of dispersed pitting and a curvilinear bank possibly forming an oval enclosure, BRD 181. Further to the south west is an oval enclosure with associated mounds and pits, BRD 182. These features are similar to other identified post-medieval enclosures and small extraction sites within the survey area. Post medieval earthworks, BRD 179, were also identified during the walkover survey south of BRD 150
- 6.4.10 Located immediately to the west is BRD 127 which appears as a slightly raised area with a wide gully running around the outside. Occasional pits are visible on the raised area as well as outside the surrounding gully along with traces of further gullies and hollows.
- 6.4.11 To the south is a mound, BRD 126, at least 2m high with at least two associated pits. This mound appears fairly recent and may be associated with military buildings to the north identified on aerial photographs.
- 6.4.12 Several features appear to the south of BRD 126 within the area now established as a heathland recreation area. These include a trapezoid enclosure, BRD 121, aligned with BRD 120, a road associated with Brandon Park House, and a linear bank, BRD 125, identified on the 1905 OS map. Located on the eastern edge of this area are a series of low (0.5-1m high) mounds. At least three were clearly identifiable during the walkover survey. The date and function of these mounds are not identified.
- 6.4.13 Also located within the heathland recreation area is a possible Bronze Age 'Bell Barrow', BRD 123, known as 'White Hill'. The mound is approximately 50-60m wide with a berm of 15-20m and an outer ditch of approximately 15m. This site is possibly the largest example in Britain and has been scheduled (SAM 31084).
- 6.4.14 Located at the western limit of the survey area alongside the A1065 is a low linear bank probably part of a post-medieval plantation bank, BRD 128. To the south of this feature are a series of large pits, mounds, banks and deep hollow ways (c.2-3m deep), BRD 178. These features extend parallel to the A1065 for most of the survey area. These features may be the remains of a further post-medieval extraction site.



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Key to Map

Cross hatching = extent of sites from SMR

Hatching = new observations from walkover survey

Figure 8. Brandon SMR and walkover survey results – eastern area (top) and western area (bottom)

Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
BRD 066	TL 7975 8528	Pmed	Extensive area of post med flint mines, surviving as earthworks although 22ha min. gone under the plough since WWII	Earthworks only visible in limited areas of woodland.	Lingheath flint mines, earthworks of schedulable quality.
BRD 091	TL 7821 8515	Pmed	Garden associated with Brandon Park House. Earthwork enclosures, circular and irregular plantations.	Earthworks still surviving.	
BRD 114	TL 7870 8520	Undated	Roughly circular mound c.18m in diameter x 1m high. A possible ornamental garden feature in the park.	Just outside survey area and not seen visited during walkover.	
BRD 120	TL 7634 8462	Pmed	Line of former road to Brandon Park House from A 1065	Still clearly visible	
BRD 121	TL 7720 8486	Undated	Trapezoid enclosure partly damaged by forest planting in 1997.	Now under recreational heathland. Some earthworks still visible.	
BRD 122	TL 7630 8450	Undated	Linear bank, c. 30cm high, adjacent to road to Brandon Park House, BRD 120. Possible formal splayed entrance feature.	Still visible	
BRD 123	TL 7717 8497	Undated	'Bell Barrow' 50-60m across with berm of 15-20m and outer ditch of approximately 15m. Possibly Bronze Age	Still visible	SAM 31084
BRD 125	TL 7750 8470	Undated	Linear bank, delineated on 1905 OS map.	On the edge of the survey area, not visited?	
BRD 126	TL 7739 8505	Undated	Small oval mound 9m x 6m x 2m high with slight surrounding ditch.	Still surviving with at least two associated pits.	
BRD 127	TL 7747 8512	Undated	Slight circular gully defining circular ridge with mature beech trees. Other more prominent, similar features have been identified as post-med circular plantations in Brandon Park.	Still surviving as visible earthwork.	
BRD 128	TL 7690 8510	Undated	Low linear bank c. 30cm high x 2m wide. Probably pmed plantation bank.	Still survives. Extensive pitting noticed during the walkover in this area – possible post-med extraction site?	
BRD 129	TL 7821 8542	Undated	Straight linear bank within Brandon Park.	Partially visible with ?associated rectangular enclosure.	
BRD 135	TL 7885 8557	Pmed	Low bank of unknown date but which largely defines eastern limits of 19th/20th century mining complex, BRD 134 and 136.	Earthwork still visible.	
BRD 136	TL 7900 8490	Pmed	Group of well preserved flint mine earthworks. Small and large circular pits and gullies. May relate to BRD 137.	Still visible	
BRD 137	TL 7880 8500	Pmed	Group of well preserved flint mine earthworks. May be part of Lingheath complex as referred to by Skertchly.	Just outside the survey area and not visited. However no earthworks identified to indicate continuation	

Site	Grid ref	Period	Summary info	Condition	Designation and/or comment
				of 136 to 137.	
BRD 150	TL 7820 8550	Preh	Flint scatter seen in tree planting furrows.	Dense forest, inaccessible	
BRD 151	TL 7820 8570	Preh	Flint scatter seen in tree planting furrows.	Dense forest, inaccessible	
BRD 154	TL 7960 8660	Preh	Late Bronze Age site excavated in advance of new housing uncovered pits, postholes, structures, cremations.	Excavated	
BRD 165	TL 7976 8654	Med	Three inhumations uncovered during garden terracing in new houses on the south edge of BRD 154. C.12th-13th century and may be possible gallows site.	Excavated, but close to road edge, so potential for more	Human remains
BRD 175	TL 7925 8566	Pmed	Several pits identified during walkover survey lying at north-west edge of Lingheath. Probably part of Lingheath mines.	Earthworks visible	New observation
BRD 176	TL 7907 8540	Pmed?	Small area of scattered hollows between Lingheath and BRD 136.	Earthworks visible	New observation
BRD 177	TL 7925 8537	Pmed?	Small area of scattered hollows between Lingheath and BRD 136.	Earthworks visible	New observation
BRD 178	TL 7676 8498	Pmed?	Large pits, mounds, hollow ways and banks around bank BRD 128. Probably evidence of a further pmed extraction site.	Earthworks visible	New observation
BRD 179	TL 7841 8551	Pmed	Rectilinear post-medieval earthwork enclosure.	Earthworks visible	New observation
BRD 180	TL 7845 8536	Pmed?	Small group of fairly large irregular pits, possibly associated with Brandon Park.	Earthworks visible	New observation
BRD 181	TL 7785 8548	Pmed?	Curvilinear bank and dispersed pitting, possibly an oval enclosure. ? Post medieval extraction site	Earthworks visible	New observation
BRD 182	TL 7766 8514	Pmed?	Pits gullies and hollows around ditched platform, BRD 127.	Earthworks visible	New observation

Table 3 Summary of results of SMR search (excluding ‘misc’ sites) and new observations.

7 Discussion

- 7.1 The archaeology of the survey area is very diverse ranging in date from the prehistoric to the 19th century. However, it is during the post-medieval period and the advent of the Brandon gun flint industry that the area sees its most intensive use.
- 7.2 The prehistoric period is visible in the archaeological record and surviving earthworks within the survey area in several forms. Two adjacent fieldwalked areas (BRD 150 and 151) showed a fairly dense scatter of worked and burnt flint indicating possible activity in the area. Two burials mounds within the survey area are scheduled (STN 005 and BRD 123) with one being possibly the largest known 'Bell Barrow' in Britain (BRD 123). Prehistoric occupation, mainly late Bronze Age, is known on the eastern edge of the modern town (BRD 154) and although outside the survey area activity may continue east. Barrows are often found in groups and the presence of extant barrows allows the possibility of other, now levelled, barrows nearby. In addition prehistoric monuments often become the focus for other, later, ritual activities (eg. Anglo-Saxon cemeteries).
- 7.3 Although there are no identifiable remains of prehistoric flint mines within the survey area this does not necessarily indicate their absence. The site of Grimes Graves to the north shows evidence of prehistoric flint mining in the immediate vicinity. The presence of high quality flint around Brandon may well have attracted early mining as well. However, the intensive post-medieval flint mining industry in this area could well hide any early pits. On the surface it would be very difficult to clearly distinguish a prehistoric from a post-medieval mine.
- 7.4 Little Roman archaeology is known from within the survey area apart from scattered finds. The only recorded Roman settlement is a settlement to the north east of the modern town in the parish Weeting with Broomhill (Norfolk SMR 35352). However, other associated finds from this area indicate activity from the Neolithic to the Post-medieval period.
- 7.5 Medieval activity is dominated by the presence of warrens over much of this part of Breckland. In this area a surviving warren bank runs down the Brandon/Santon Downham parish boundary, and will inevitably be crossed by the road at some point. Three early medieval burials (BRD165) may represent a gallows site, and further evidence of this may be present along the parish boundary by the B1107.
- 7.6 The majority of the surviving earthworks are post-medieval in date and mainly relate to the flint mining industry of Brandon. The focus of the flint mining industry is the area centred on Lingheath (BRD 066 and 095). This area has been fairly well studied in the past and is well covered in the historical survey commission for this assessment (Appendix 3). The survey by the Royal Commission for Historic Monuments (RCHM) has highlighted the nature of the surviving earthworks and the aerial photographs show the intensity of the mining (Figure 9). However, the Lingheath site is only one part of a much larger post-medieval industrial landscape. Surviving earthworks from flint mining can be seen to extend across the whole southern survey area from the B1106, in Brandon parish, across the southern half of Santon Downham parish. Although breaks appear between the various mining sites within the survey area these sites form parts of a whole post-medieval mining landscape. The exact limits of the mining sites is very difficult to distinguish as pits become dispersed and may easily be missed during a coarse walkover survey such as that conducted for this assessment. A rapid survey carried out in 1996 (Pendleton 1996) identified five groups of mines within this area whose limits

appeared to relate to existing field boundaries, but this cannot be confirmed. The area immediately to the north of Lingheath also needs further work to understand whether the mines continue. Both the documentary and aerial photographic (Figure 9) searches found evidence of the pits within now ploughed land.

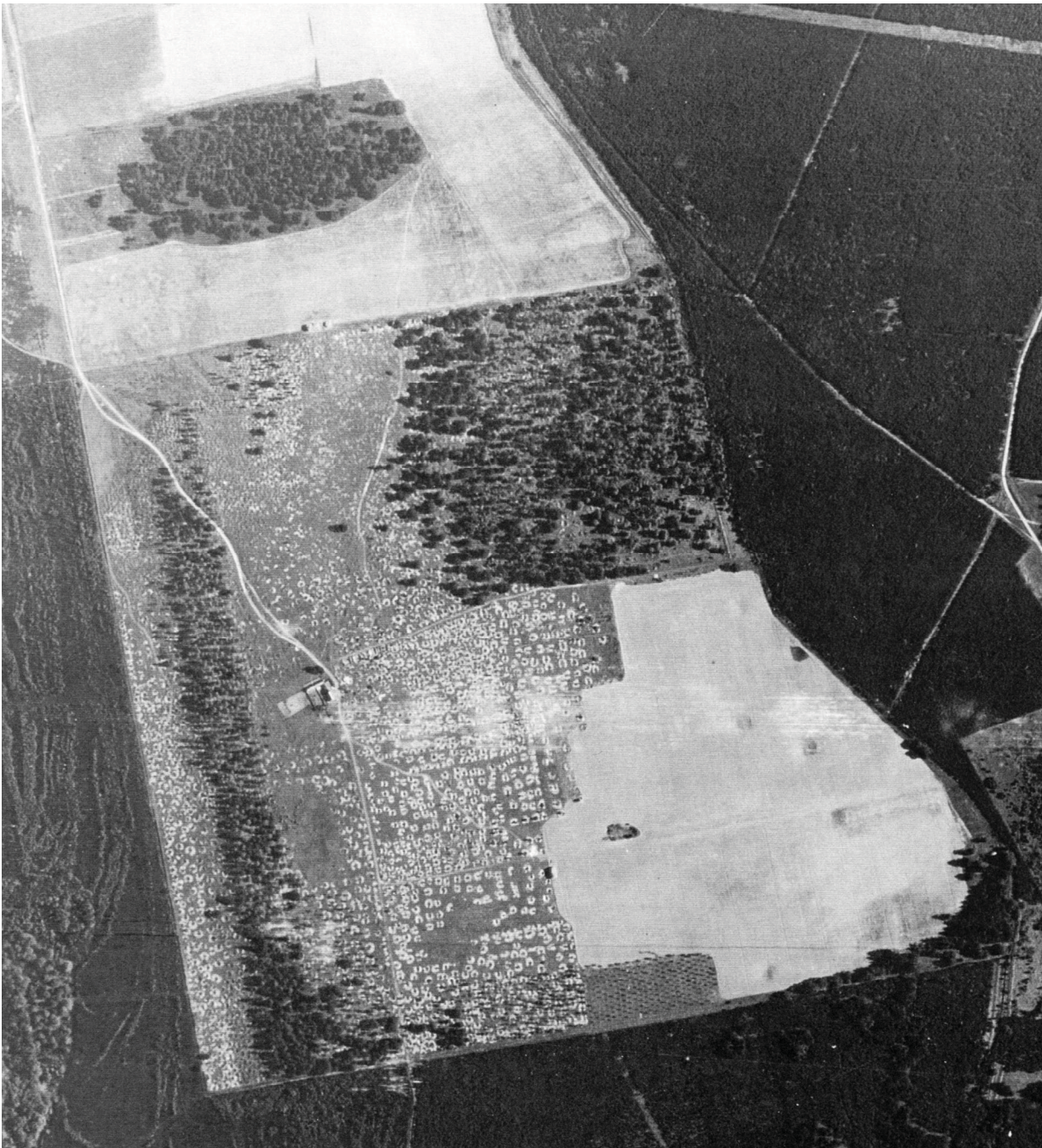


Figure 9. Lingheath aerial photograph (RAF photograph 106G-1557-4008)

- 7.7 The Lingheath and STN 038 mining complexes are separated by the parish boundary, along which also runs the surviving post-medieval warren bank. The STN 038 mines are earlier than Lingheath (C.Pendleton pers comm) and belonged to the Cadogan Estate, however the documentary search records that the parish boundary has moved slightly eastwards (encroaching on Cadogan land?), with mines apparent between the old and new lines. It is suggested (Pearson 1996) that this shift was to bring more land into the Lingheath ownership for the sinking of new mines.

- 7.8 As well as the flint mining industry there is also evidence for other extraction industries. Chalk and gravel extraction is evidence by large quarry pits of which at least two are visible in Santon Downham parish. The series of large pits at the northern limit of the survey area in Weeting with Broomhill parish may also represent large scale extraction. These other forms of post-medieval activity indicate the area around Brandon is a complex industrial landscape.

8. Conclusion and Recommendations

- 8.1 Although a great deal of information is known about the area covered in this survey there is more archaeological work that would be necessary before road construction could get under way. The work undertaken for this assessment can only be taken as a preliminary evaluation of the archaeology within the area of the proposed bypass route, in order to identify major constraints.
- 8.2 The area of Lingheath and its immediate vicinity undoubtedly needs further study. This archaeological site is of national importance as it is the focus of the British gunflint industry of the 19th century. Although limits of the pitting have been roughly established to the west and east of Lingheath the ploughed area to the north needs further study. More detailed fieldwalking than was possible in the walkover survey may help to establish a northern limit though visibility on the ground is very poor in this area. Geophysical survey or trial trenching would probably be a more appropriate strategy in this area. This could also help to establish the relationship between the flint mines and land and property boundaries, and look at the relationship between the groups of mines identified in previous surveys.
- 8.3 The exact nature and date of these flint mines also needs further examination. Dating of these pits is very difficult from a surface inspection and areas of prehistoric pits may survive within the areas dominated by the post-medieval pits. Detailed examination of the pits might also help form a post-medieval chronology for pit types that could be used to help date other sites.
- 8.4 No evidence of Neolithic mining has so far been identified in this area, however it would be difficult to distinguish prehistoric shafts from post-medieval ones from earthworks or aerial photographs, particularly because if close to the post-medieval mines, the pre-existing shafts are likely to have been filled with upcast soil. It is, however, likely that Neolithic mining would take place in roughly the same areas as the post-medieval works as these represent the best flint seams. It is not probable that Neolithic mines will survive in the areas of greatest density of post-medieval mines, as the presence of pre-existing shafts would destabilise the ground for adjacent mines, unless the earlier shafts were reused. In addition the existence of a high density of later mines implies that the flint deposits have not been previously extracted. Therefore it seems more likely that examination of areas of sporadic post-medieval mining or just beyond the edges of the known mines might have greater potential for revealing prehistoric activity. The most accessible difference between the prehistoric and post-medieval flint mining is the nature of the knapping debris; fieldwalking of ploughed areas around Lingheath would be a simple way of establishing the possibilities for the presence of prehistoric mining. This could be followed by targeted trial trenching if the results looked promising.

- 8.5 Any prehistoric flint mines identified need to be examined on a broad landscape scale as well as in detail in order to aid comparison with Grimes Graves and to give it greater landscape context.
- 8.6 A project designed to plot digitally Skertchly's evidence of the flint mining industry in 1879 would be of great benefit to the study of the flint mines.
- 8.7 The archaeology within the survey area is diverse. Although dominated by the post-medieval flint mining industry, Roman and prehistoric settlements, as well as prehistoric barrows, are visible within the survey area.
- 8.8 The proposed road line passes very close to the largest known example of a Bell Barrow in Britain, a Scheduled Ancient Monument and therefore, a site of national importance, which lies within a heathland recreation area. If threatened, further survey work would be necessary in this area, geophysical, topographical and/or trial trenching to establish a landscape context for this monument. As the land is currently heathland, fieldwalking alone would be insufficient.
- 8.9 High quantities of finds have been recovered from the Roman site in Weeting, and although now covered in trees evidence from sites with similar tree cover (for example. at Mildenhall) has shown that significant remains can survive. Trial trenching would be necessary to establish the density of state of preservation of this site.
- 8.10 Further field evaluation, in the form of targeted trial trenching, near the possible gallows site at BRD 165 will be necessary if the route of the road passes close to here. Extensive excavation has identified Middle Saxon origins for Brandon with evidence of population shift to the current town in the Late Saxon period. This outlying site has the potential to contribute to the body of evidence already held about medieval life in Brandon.
- 8.11 This site lies on the southern edge of a prehistoric occupation site and the possibility of features relating to this continuing into the development area would also need investigating by trial trenching.
- 8.12 Rabbit farming was a very important industry in Breckland from the 12th century onwards and the line of this route travels through known warren land. Although over much of the area little can be expected to be found relating to these, the route is likely to cross at least one warren bank (Santon Downham parish boundary) and runs close to a the Warren Lodge at Bromehill, marked on an 18th century map. Further work, either geophysical survey or trial trenching will be necessary to establish the existence of this.
- 8.13 The parish boundary between Brandon and Santon Downham, between Lingheath and the outskirts of Brandon shifted in the 19th century. To the east of it lie the earlier flint mines belonging to the Cadogan Estate and to the west, the probably later mines of Lingheath. A post-medieval warren bank runs along the current line. The movement of this parish boundary, its relationship with the medieval and post-medieval warren and the earlier and later flint mining industry needs further examination. This could probably be best achieved by examination of any further documentary sources relating to the Cadogan Estate should they survive, followed by trial trenching through the Cadogan mines, across the boundary and into the Lingheath area. This could only responsibly be carried out if it was confirmed that this area was under direct threat as it would be a destructive intrusion into a site of schedulable quality.

- 8.14 The area to the south and east of Brandon is therefore an archaeologically sensitive area into which the proposed road scheme would have a serious impact. The post-medieval and prehistoric archaeology is of national importance, and the potential evidence for medieval life from study of the possible gallows area and the warrens is of regional importance when seen alongside previous work.

John Duffy
January 2005

Disclaimer

Any opinions expressed in this report about the need for further archaeological work are those of the Field Projects Division alone. The need for further work will be determined by the Local Planning Authority and its archaeological advisors when a planning application is registered. Suffolk County Council's archaeological contracting service cannot accept responsibility for inconvenience caused to clients should the Planning Authority take a different view to that expressed in the report.

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APPENDIX 1

SUFFOLK COUNTY COUNCIL ARCHAEOLOGICAL SERVICE - CONSERVATION TEAM

Outline Brief for an Archaeological Desktop/Field Assessment of the Potential Flint Mine Areas on Brandon Bypass Routes

1. **Background And Objectives**

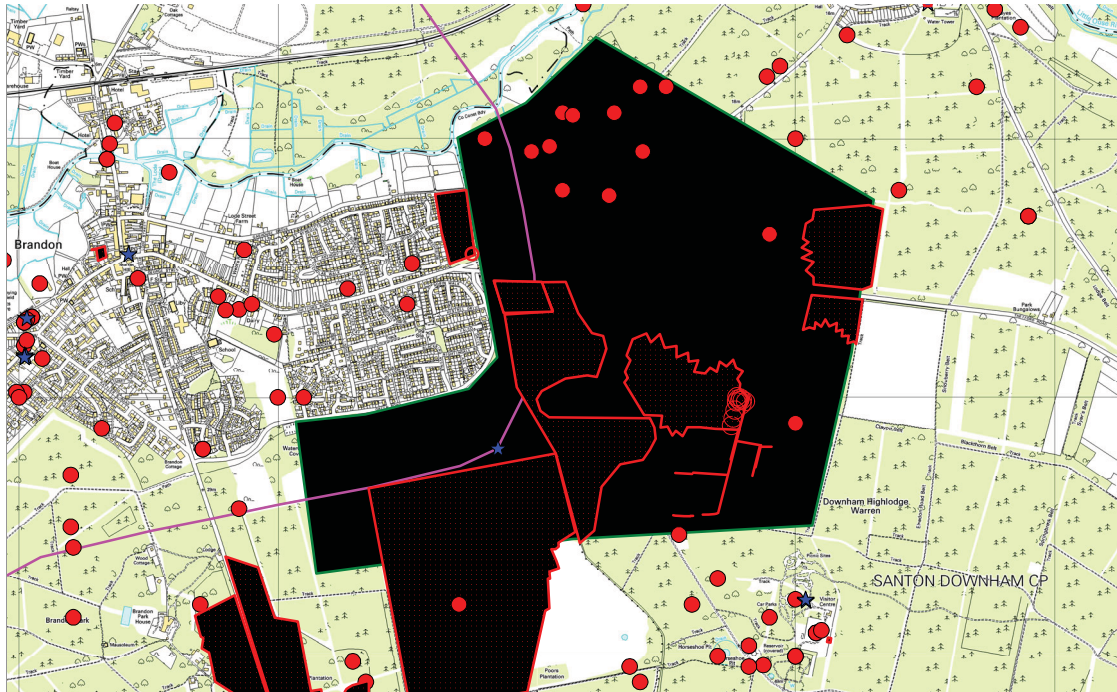
- 1.1 Possible routes for a Brandon bypass are under consideration by Suffolk County Council. Current thinking favours an eastern route (as per LPT2 major scheme review, reference Pre LTP2).
- 1.2 A major potential constraint is the existence of important groups of flint mines from Lingheath (BRD 095) north and east (STN 018, 038), mainly of post medieval date but with the possibility of prehistoric workings, which would certainly be of national significance.
- 1.3 SCC need information which could impact on broad route design at an early stage (i.e. in advance of full assessment of possible routes).
- 1.4 Information collected for this stage of the scheme should be held in a form that will be easily accessed and re-worked in future assessments, e.g. all mapped information should be on GIS.

2. **Brief**

Unless otherwise specified, see Figure attached for geographical area to be covered.

- 2.1 Collate all Sites and Monuments Record information including backlog reports, Breckland Survey data, etc.
- 2.2 Check all available maps, including the Tithe, especially noting any indications of extraction works. Record available ownership and land use information in 19th century (as an indicator of likely exploitation areas).
- 2.3 Examine air photographs held by SCC and English Heritage (Swindon) for evidence of extraction pits.
- 2.4 Check documentary sources held by SCC and the de Lotbiniere Papers (Cambridge).
- 2.5 Carry out walk-over survey to record current land use, to check potential extraction areas identified in documentary work and to identify any other possible earthworks.
- 2.6 Evaluate by trial trenching any potential flint mining areas identified in this process which are on or close to the possible road line
- 2.7 Prepare a report on the results which includes full cross reference to the digital (MapInfo) record and identifies the potential for future fieldwork evaluation.

Specification by: Judith Plouviez



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Figure 10 Area to be surveyed.

APPENDIX 2

**BRANDON BYPASS,
TL776855 – TL800860 – TL799875,
SUFFOLK:
AERIAL PHOTOGRAPHIC ASSESSMENT
By AIR PHOTO SERVICES**

SUMMARY

This assessment of aerial photographs examined the corridor of a new bypass between TL776855 – TL800860 – TL799875 in order to identify and accurately map archaeological and natural features.

No definite archaeological features were recognised but features suggested as possibly archaeological include groups of hollows and ridges and a large area of pits that may be former flint mines.

Original photo interpretation and mapping was at 1:2500 level.

**BRANDON BYPASS,
TL776855 – TL800860 – TL799875,
SUFFOLK:
AERIAL PHOTOGRAPHIC ASSESSMENT**

Rog Palmer MA MIFA

INTRODUCTION

This assessment of aerial photographs was commissioned to examine the corridor of a new bypass between TL776855 – TL800860 – TL799875 in order to identify and accurately map archaeological and natural features and thus provide a guide for field evaluation. The level of interpretation and mapping was to be at 1:2500.

ARCHAEOLOGICAL AND NATURAL FEATURES FROM AERIAL PHOTOGRAPHS

In suitable cultivated soils, sub-surface features – including archaeological ditches, banks, pits, walls or foundations – may be recorded from the air in different ways in different seasons. In spring and summer these may show through their effect on crops growing above them. Such indications tend to be at their most visible in ripe cereal crops, in June or July in this part of Britain, although their appearance cannot accurately be predicted and their absence cannot be taken to imply evidence of archaeological absence. In winter months, when the soil is bare or crop cover is thin (when viewed from above), features may show by virtue of their different soils. Upstanding remains, which may survive in unploughed grassland, are also best recorded in winter months when vegetation is sparse and the low angle of the sun helps pick out slight differences of height and slope.

Such effects are not confined only to archaeological features. Disturbance of soil and bedrock can produce its own range of shadow, crop and soil differences and it is hoped that a photo interpreter, especially one familiar with local soils, is able to distinguish archaeological from other features. There may, however, remain some features of unknown origin that cannot be classified without specialist knowledge or input from field investigation.

PHOTO INTERPRETATION AND MAPPING

Photographs examined

The most immediately informative aerial photographs of archaeological subjects tend to be those resulting from observer-directed flights. This activity is usually undertaken by an experienced archaeological observer who will fly at seasons and times of day when optimum results are expected. Oblique photographs, taken using a hand-held camera, are the usual products of such investigation. Although oblique photographs are able to provide a very detailed view, they are biased in providing a record that is mainly of features noticed by the observer, understood, and thought to be of archaeological relevance. To be able to map accurately from these photographs it is necessary that they have been taken from a sufficient height to include surrounding control information.

The collection of military obliques recently acquired by English Heritage comprises some 70,000 prints taken in the 1940s, 50s and 60s. Subjects include anti-invasion defences and other military sites along with some post-war developments, rural and coastal sites.

Vertical photographs cover the whole of Britain and can provide scenes on a series of dates between (usually) 1946-7 and the present. Unfortunately these vertical surveys were not necessarily flown at times of year that are best to record the archaeological features sought for this Assessment and may have been taken at inappropriate dates to record crop and soil responses that may be seen above sub-surface features. Vertical photographs are taken by a camera fixed inside an aircraft and adjusted to take a series of overlapping views that can be examined stereoscopically. They are often of relatively small scale and their interpretation requires higher perceptive powers and a more cautious approach than that necessary for examination of obliques. Use of these small-scale images can also lead to errors of location and size when they are rectified or re-scaled to match a larger map scale.

Cover searches were obtained from the Cambridge University Collection of Aerial Photographs (CUCAP) and the National Monuments Record: Air Photographs (NMRAP), Swindon. Photographs included those resulting from observer-directed flights and routine vertical surveys.

Photographs consulted are listed in the Appendix to this report.

Base maps

A base map compiled from OS digital data at a survey scale of 1:2500 was provided by the client.

Study area

Photographs were examined in detail for an area extending one modern field beyond the assessment area.

Photo interpretation and mapping

All photographs were examined by eye and under slight (2x) magnification, viewing them as stereoscopic pairs when possible. When working in photo libraries, interpretations were marked on overlays to individual prints following procedures described by Palmer and Cox (1993). It was agreed that photographs of the possible flint mines could be included as background pictures to the OS map so laser copies were purchased from NMRC. These and any interpretative overlays were scanned and transformed to match the base map using Irwin Scollar's AirPhoto program (Scollar 2002).

Transformed files were set as background layers in AutoCAD Map, where features were overdrawn, making reference to the original prints, using standard conventions. Layers from this final drawing have been used to prepare the figures in this report and have been supplied to the client in digital form.

Accuracy

AirPhoto computes values for mismatches of control points on the photograph and map. In all transformations prepared for this assessment the mean mismatches were less than $\pm 1.50\text{m}$. These mismatches can be less than the survey accuracy of the base maps themselves and users should be aware of the published figures for the accuracy of large scale maps and thus the need to relate these mismatches to the Expected Accuracy of the Ordnance Survey maps from which control information was taken (OS 2004).

COMMENTARY

Soils

The Soil Survey of England and Wales (SSEW 1983) shows the area to have pockets of chalky drift (soil association 521: METHWOLD) within a larger expanse of glaciofluvial drift (soil associations 551g: NEWPORT 4 and 554b: WORLINGTON). The Soil Survey Legend noted that 554b sometimes shows 'widespread small-scale polygonal soil patterns' in crops which may react similarly to sub-surface archaeological features.

Possible archaeological features

No definite archaeological features were identified on the photographs examined but three groups of possible features have been included on the map (Figure 2 –see section in main report).

TL793858. A small area of parallel ridges. These were suspect as archaeological and may be of natural origin. Similar 'stripes' were noted in the wider area, some of which are now under recently-built houses.

Area centred TL798852. A large number of small pits survived in earthwork form between 1946 and 1959 (Figures 11 and 12) but had been ploughed by 1971. Each pit had an associated bank (?of spoil) that usually had been formed in a horseshoe shape, as if access was by means of the unbanked part. In places their distributions seems to be unplanned while in other parts they appear to form lines. Both include examples where banks are superimposed, suggesting that the working of the pits was spread over at least a small time span.

Their origin and purpose is unknown as is the reason for their survival in upstanding form in the 1940s in an area that otherwise seems to be intensively farmed or wooded. Judging by the small and regular amount of spoil the pits seem unlikely to be very deep but, if they are contenders for flint mines, they may be seeking material close to the surface. But if that was the case it would seem more efficient to clear a larger area rather than dig a series of small pits. An alternative explanation may link them with forestry, but this seems even less likely.

Figures 11 and 12 are both transformed photographs that show the area in June 1946 and January 1959. At first glance it appears that there are more pits in 1959 but this seems likely to be an effect of the low winter sunlight and its ability to enhance the appearance of slight earthwork features. Both photographs show what look like plough-levelled examples of pits at TL794857, just south-west of the small wood and north of the main group of pits. Other levelled pits may remain unrecorded on the photographs examined.

TL798868. A spread of hollowed features were photographed in January 1947. These may indicate former paths but may be less structured examples of the ridges noted at TL793858.

Non-archaeological features

TL798870. A small number of loosely-scattered trees were noted in this area. These had been removed by 1953 on which date they were photographed on military obliques as small pits that may be thought to be of archaeological significance if these photographs are examined in isolation.

TL799864. One small field was a quarry in 1971.

Land use

The area has a high percentage of woodland with small arable fields. This mixture may have discouraged any airborne archaeologist from close examination of the ground and past features may be under-represented as a result.

REFERENCES

- OS, 2004. <http://www.ordnancesurvey.gov.uk/productpages/landline/positional-background.htm>
- Palmer, R. and Cox, C., 1993. *Uses of aerial photography in archaeological evaluations*. IFA Technical Paper 12.
- Scollar, I., 2002. Making things look vertical, in Bewley, R.H. and Rączkowski, W., (ed). *Aerial archaeology: developing future practice*. NATO Science Series, Vol 337, 166-172.
- SSEW, 1983. *Soils of England and Wales: sheet 4: Eastern England (1:250,000)*. Soil Survey of England and Wales, Harpenden.

APPENDIX

Aerial photographs examined

*Source: Cambridge University Collection of Aerial Photographs
(web search 18 September 2004)*

Oblique photographs

AEX 3-4 1 June 1962

Source: National Monuments Record: Air Photographs (cover search 71466A)

Military obliques

TL7986/11 3 September 1953
TL7987/3-4 3 September 1953
TL7987/7-8 3 September 1953
TL8087/11-12 3 September 1953

Vertical collection

RAF/106G/UK/LA/227: 2148-2151	17 April 1945	1:10000
RAF/106G/UK/1557: 2007-2008	7 June 1946	1:9800
RAF/106G/UK/1557: 4007-4011	7 June 1946	1:9800
RAF/106G/UK/1634: 2401	9 July 1946	1:10000
RAF/106G/UK/1634: 5398-5401	9 July 1946	1:10000
RAF/106G/UK/1707: 3196	29 August 1946	1:9500
RAF/106G/UK/1707: 4072	29 August 1946	1:9500
RAF/CPE/UK/1918: 3075-3076	9 January 1947	1:10000
RAF/CPE/UK/1952: 3201-3202	25 March 1947	1:10000
RAF/CPE/UK/2021: 3061-3063	21 April 1947	1:9800
RAF/58/649: 4124	23 April 1951	1:10000
RAF/58/651: 3297-3298	24 April 1951	1:10000
RAF/58/1260/F21: 5-6	7 September 1953	1:10000
RAF/58/2688/F21: 362-367	25 January 1953	1:9600
RAF/58/2688/F21: 402	25 January 1953	1:9600
RAF/82/1204/F21: 9-12	2 June 1955	1:9600
RAF/82/1204/F21: 57-60	2 June 1955	1:9600
RAF/82/1204/F21: 67	2 June 1955	1:9600
RAF/58/1890: 6-8	14 October 1955	1:10000
RAF/540/1733: 6-8	1 November 1955	1:10000
RAF/543/T/899/F21: 25	5 May 1960	1:10000
RAF/543/T/899/F22: 25-26	5 May 1960	1:10000
OS/71216: 56-57	14 May 1971	1:7500
OS/71216: 86-89	14 May 1971	1:7500
OS/71369: 345-347	21 July 1971	1:7000
OS/71369: 349-350	21 July 1971	1:7000
MAL/83025: 140-142	23 October 1983	1:10000
OS/HSL/84238: 42-45	21 October 1984	1:10000

Most informative photographs

TL793858 RAF/82/1204/F21: 10-11

TL798852 RAF/106G/UK/1557: 4007-4008, RAF/58/2688/F21: 365-3667

TL798868 RAF/CPE/UK/1918: 3075-3076

TERMS AND CONDITIONS

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Air Photo Services has consulted only those aerial photographs specified. It cannot guarantee that further aerial photographs of archaeological significance do not exist in collections that were not examined.

Due to the nature of aerial photographic evidence, Air Photo Services cannot guarantee that there may not be further archaeological features found during ground survey which are not visible on aerial photographs or that apparently 'blank' areas will not contain masked archaeological evidence.

We suggest that if a period of 6 months or more elapses between compilation of this report and field evaluation new searches are made in appropriate photo libraries. Examination of any newly acquired photographs is recommended.

That the original working documents (being interpretation overlays, control information, and digital data files) will remain the property of Air Photo Services and be securely retained by it for a period of three years from the completion date of this assessment after which only the digital files may be retained.

It is requested that a copy of this report be lodged with the relevant Sites and Monuments Record within six months of the completion of the archaeological evaluation.

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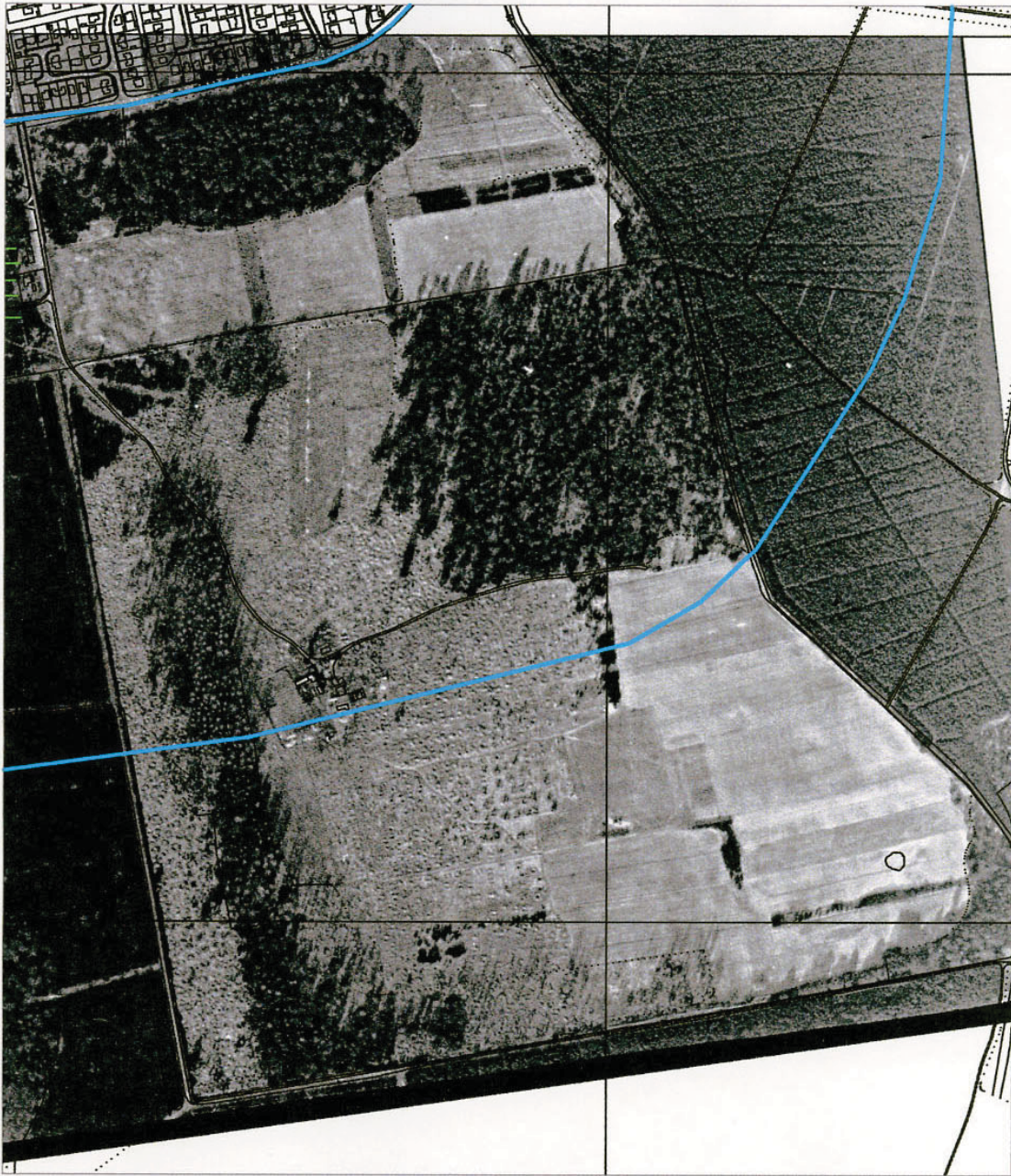
Brandon Bypass, Suffolk:
Features recorded on aerial photographs.
Figure 11. Area centred on TL799854



Area of possible flint mines photographed on 7 June 1946. Photograph transformed to fit modern OS base map and overlain with a grid at 100m intervals.
English Heritage (NMR) RAF photography: 106G/UK/1557: 4008.

Figure 11 Features recorded on aerial photographs, 1946

Brandon Bypass, Suffolk:
Features recorded on aerial photographs.
Figure 12. Area centred on TL799854



Area of possible flint mines photographed on 25 January 1959. Photograph transformed to fit modern OS base map and overlain with a grid at 100m intervals.
English Heritage (NMR) RAF photography: F21. 58/2688: 0365.

Figure 12 Features recorded on aerial photographs, 1959

APPENDIX 3

HISTORICAL SURVEY REPORT

Brandon Bypass Proposed Route

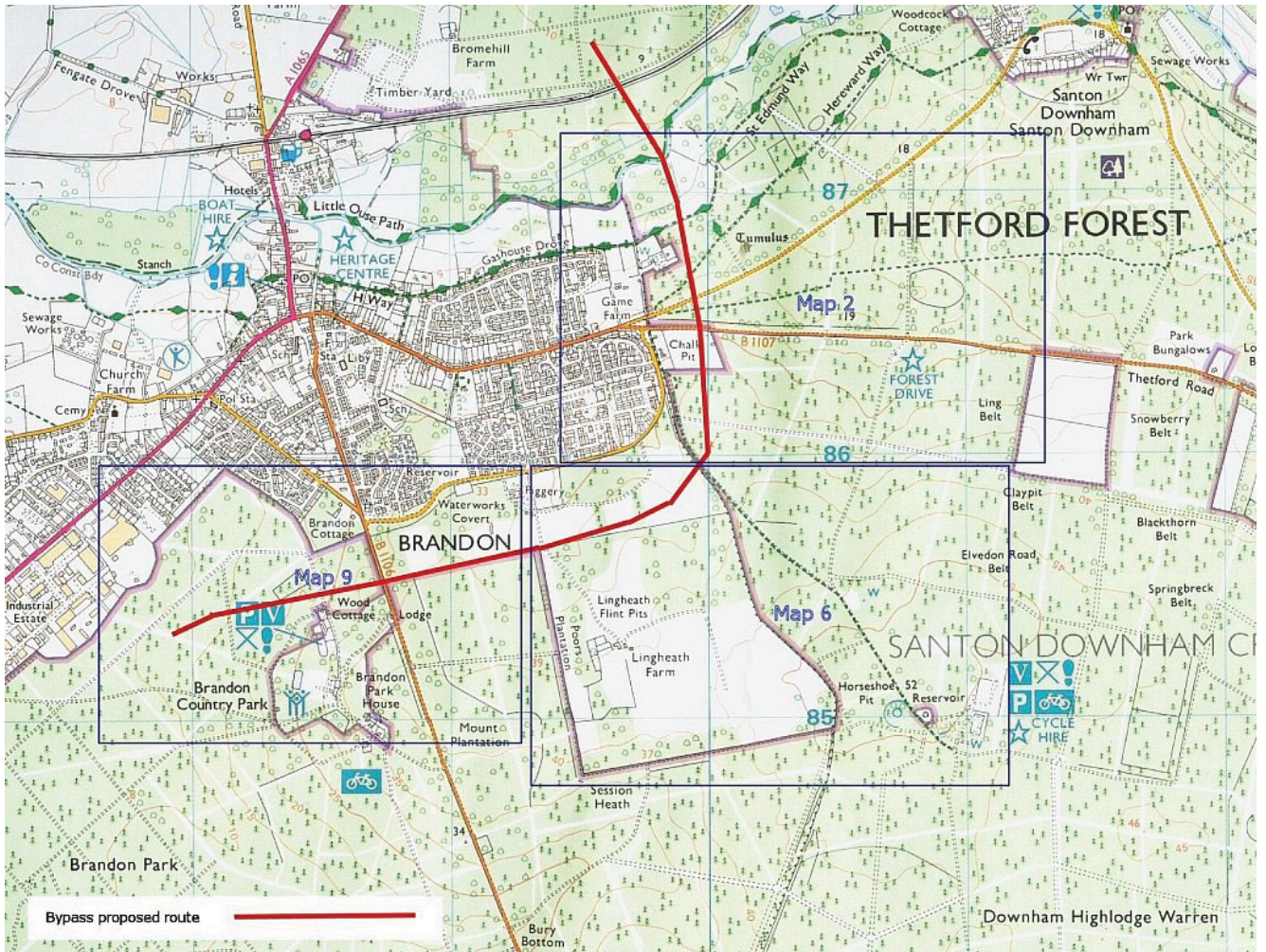
Report No: 001.11/04

**Commissioned by:
Suffolk County Council Archaeological Service
Field Team**

November 2004

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Figure 13 Map 1 - Ordnance Survey 1:25 000 scale Explorer 229

SUMMARY

“From palaeolithic times to the present day the vicinity of Brandon has been one of the great emporia for flint.” (Skertchly, 1879, 39)

A report by the Royal Commission on the Historical Monuments of England (RCHME), published in 1996, argues that while Sydney Skertchly’s assertion that Brandon was an “outlier of the stone age” (1879, 69) might be described as “fanciful”, the notion that flint could have been taken from the area in Neolithic times should not be discounted; “since it shares a common geology with Grime’s Graves and any Neolithic workings could have been subsumed by those of later date” (Pearson 1996, 3). Support for a likely Neolithic presence can be found in the Suffolk County Council Sites and Monuments record for Brandon Parish, which notes several surface scatters of worked Neolithic flints. Just outside the corridor of land under consideration in this report, locations with names such as White Hill Plantation and The Mount suggest the presence of possible prehistoric monuments while numerous, though as yet largely undated, earthworks e.g. BRD 106 Mount Plantation SF15369 Round Barrow - located in Mount Plantation to the west of Lingheath Farm (TL79298498), attest to a long history of human activity in the area.

Evidence of early activity may have been ploughed out of existence in the more heavily cultivated areas of the parish, while on the poorer ground, once barren heathland suitable only for the rearing of sheep and rabbits, devastating sand blows such as that recorded in 1668, which choked the River Little Ouse and buried houses at nearby Santon Downham (SRO HD 1321/2), could conceivably have covered all traces of both pre-historic and post-medieval flint extraction; as the partly covered Neolithic mining site at Buckenham Toft, Norfolk (an outlier of Grime’s Graves), clearly demonstrates (Barber *et al* 1999, 27-28).

In addition the steady expansion of the busy market town of Brandon, not to mention centuries of quarrying activity within the parish for chalk and gravel, as well as the extensive early 19th-century forest plantations of the Brandon Park Estate, followed a century later by those of the Forestry Commission (since 1922), may all have played a part in obscuring whatever sites might once have existed on the flint-rich chalk belt upon which the town was built (Barber *et al.* 1999, 31,33; Forrest 1983, 6).

For this reason, the partially preserved complex of post-medieval flint mines to be found at Lingheath Farm, Brandon, (a section of which falls within the designated area of study) is of immense interest and historical importance, being a rare relic of a now vanished industry. Close by, scattered clusters of pits have been discovered, possibly also flint-mines, some of which may pre-date the Lingheath complex, and which lie on both sides of the parish boundary with neighbouring Santon Downham; although only a full survey will be able to determine the age and extent of such workings (trees and undergrowth permitting).

Considered together with its proximity to the largest known complex of prehistoric flint mines in Britain, less than 3 miles (5km) to the north at Grime’s Graves (Forrest 1983, 2), as well as the possibility of Neolithic activity at Icklingham 12 miles (19km) to the south (Forrest, 1983, 97), like Brandon, the site of 19th-century flint extraction for the production of gunflints, it is clear that a wide area, but particularly that to the north of Lingheath Farm and the stretch of woodland between Lingheath and the River Little Ouse at Santon Downham, will require further, extensive examination. For, although a great deal is known about Brandon’s long dominance of the industry through the production of its world-famous ‘Brandon Black’ gunflints, surprisingly little information is available regarding the origins and development of the various workings from which the raw material was extracted.

INTRODUCTION

This report was commissioned by the Field Team of Suffolk County Council's Archaeological Service to assist in the evaluation of a proposed route for a bypass around the town of Brandon, Suffolk.

A section of the proposed route traverses an area known to have been utilised in the late 18th, 19th and the first half of the 20th centuries for the extraction of high quality 'black' flint, which was then knapped to make durable and reliable gun-flints (see Map 1). These quarries and mines also produced flint of a lesser quality, which might be fashioned into one component of 'flint and steel' strike-a-lights, or trimmed as building stone, with the waste products being put to good use as hard-core or in highway construction and maintenance.

However, it is both the pivotal role played by the 'Brandon Black' gunflints in the British Army's victory in the French Wars (1792-1815), when, by the time of Waterloo (1815), Brandon's flint masters held a virtual monopoly on supply to the Board of Ordnance, and the preservation of what may be the "largest complex of surviving post-medieval flint mines in England" (T. Pearson, RCHME, *pers. comm.* as reported in Sussams 1996, 128) that elevate this landscape from being simply a fascinating site of local industrial history to one of national importance.

The 1996 RCHME Field Survey Report represented the first in-depth study of Brandon's flint mines but its scope was confined to the Lingheath mining complex (NMR TL 78 NE 81) just over a mile (2km) to the south-east of the town (the northern section of this site falls within the corridor of land here under investigation – see Fig. 1). Nevertheless the report suggests that that, despite around 2,000 individual pits were identified, "the total area of extraction was probably much larger" (Pearson 1996, 2); in fact nearly 120 years earlier Skertchly had written, "Lingheath is completely honey-combed with new and old pits, from Brandon Park on the West to the slope of the Ouse Valley on the east" (1879, 5). And as we have seen, its proximity to the Neolithic flint mines at Weeting, Norfolk, known as Grime's Graves, suggests that the origins of flint extraction at Brandon may be much earlier than the 18th century - an hypothesis still to be tested by archaeological survey.

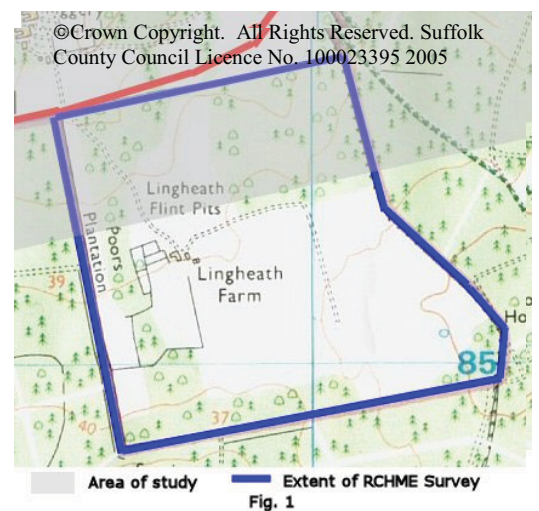


Figure 14
Study and RCHME Survey Areas

It is the purpose of this study, therefore, to assist in an attempt to define the age and extent of flint extraction activity in the immediate vicinity of the proposed bypass route and to identify areas for further investigation.

METHODOLOGY

In accordance with the brief supplied by the Suffolk County Council Archaeological Service Field Team, all available 19th century maps, including the 1809 Enclosure map and the 1838 Tithe map were checked and all indications of extraction works noted. A full list of the maps consulted is available on page 31 of this report.

Ownership and land use for the 19th century (which could prove to be indicators of likely exploitation areas) was recorded wherever possible. (Section 2.20)

Documentary sources were also checked including the collection of papers bequeathed by Mr. Seymour de Lotbiniere, once the owner of Brandon Hall, to the Cambridge Museum of Archaeology and Anthropology, as well as the accounts and work books of the Brandon Select Vestry: Gunflint Committee and those of the subsequent Brandon Gun Flint Company, among others (Section 2.4)

BACKGROUND

Flint

Second only to diamond in hardness (Barber *et al* 1999, 22), flint is found naturally in chalk, often in seams or bands and either in nodular or tabular form although a wide variety of shapes and sizes, not to mention colours can be found. Good quality flint, often extracted from the deepest layers, fractures in a regular and predictable manner, enabling countless generations of skilled craftsmen to produce a wide variety of practical, tools and weapons (Forrest, 1983, 2).

Sparks created by striking an iron or ‘fire-steel’ across the edge of a flint stone had been used to ignite gunpowder since the 15th century and yet the flintlock musket (probably invented towards the end of the 16th or beginning of the 17th century) was not introduced into the English army until 1686; it would be another 30 years before gunflints were mass produced (until then the soldier had to find and shape his own). Skertchly believed that “the old gun-flints were, in fact, only modifications of the existing strike-a-lights,” although slightly smaller, which in their resemblance to even earlier ‘scrapers’ suggested a continuous chain of evolution (1879, 3) an hypothesis later disputed by Roy Rainbird Clarke (Clarke 1935, 43) who accused Skertchly of selecting his evidence. It was said that a good flint would last a gunner ½ a day, although when worn it would often misfire (Skertchly 1879, 4).

In his exhaustive and comprehensive study of the excavation and knapping of flint, for which he spent a period of time as a resident of Brandon, Skertchly identified several locations for its extraction, in addition to the Lingheath pits. Those to be found within the parish of Santon Downham, he said, were situated on the Warren, opposite the Warren Lodge, not far from a tumulus known locally as Blood Hill and within the eastern portion of the Half Moon plantation. These shallow or ‘fleet’ pits (Skertchly 1879, p6; Clarke 1937, 44) were on the slope of the valley-side and, he deduced, had been worked out before the Lingheath pits were opened (Skertchly 1879, 8-9), as had a group of old flint-pits at the Elms Plantation in Brandon Park (*ibid.* 10). While, to the north of the Little Ouse, at Broomhill, Norfolk, between the late-Neolithic – early-Bronze Age pits of Grime’s Graves and the Broomhill plantation, he had found a complex of mines much deeper than those at Santon Downham (*ibid.* 9).

A recent study of known flint extraction sites concludes that the majority can be found “to the south of Brandon in the dry area between the Lark and Little Ouse valleys, where the chalk is close to the surface” (Sussams 1996, 121).

In 1790, Philip Hayward, described as a Brandon flint manufacturer (although based at that time in Bury St Edmunds), received a Board of Ordnance order for “100,000 flints of the best sort,” and yet a trade directory of 1793 makes no mention of flint mining or knapping activities in the town (Lotbiniere, 1980; Sussams 1996, 119). Mr. Seymour de Lotbiniere, who conducted his own research into the flintknapping trade, was of the opinion that gunflint knapping (and consequently flint extraction) did not become firmly established in Brandon until the introduction of the superior “platform flint” design brought over from France in 1775, the industry being given greater impetus later by the outbreak of the French Wars. Skertchly, however, believed that mining for flint had been carried on in the area since at least 1720 (1879, 5), possibly at Santon Downham and also in the pits discovered at the Elms Plantation on the

Brandon Park estate, both locations having been worked out before the exploitation of Lingheath began. A footnote in *The Breckland Archaeological Survey* states that “Scatters of flint waste relating to wedge [an earlier form of gunflint design] production have been recovered, primarily from sites now in the forest, suggesting that there was some small-scale production in the Brandon area” (Sussams 1996, 120).

Clarke put forward the theory that “When the pits near the river, known as the ‘Fleet’ pits were exhausted, mining operations followed the flint seam southwards and westwards to the heath, the pits becoming ever deeper.” (Clarke, 1937, 119), but the pits at the Elms plantation, now thought to pre-date those at Lingheath, as Skertchly suggested, are to be found a further mile or so (2km) to the south west.

By 1813, the flint masters of Brandon had attained dominance in the gunflint trade, receiving orders for the production of more than 1,000,000 musket flints a month (Forrest 1983, 63) with perhaps as many as 50-75 shafts being open at once at Lingheath (Pearson 1996,17).

Extent of the Lingheath mining complex

Despite the inevitable decline in Brandon’s flint-knapping industry that followed the end of the French Wars, and the British army’s widespread adoption of percussion cap technology in 1838, leading to the cancellation that same year of the profitable Board of Ordnance contract, coming as it did, hard on the heels of the development of ‘friction lights’ which had significantly reduced the demand for strike-a-light flints, the opening up of new markets in the colonies (and North America) saw mining at Lingheath struggle on, the focus of activity slowly creeping eastwards and southwards as new pits gradually encroached upon what had previously been arable land and open heath; a movement demonstrated by comparing the 1926 and 1882 Ordnance Survey maps (Pearson 1996, 4).

An ‘outward shift’ can also be traced in the line of the parish boundary which corresponds with the eastern boundary earthworks of the Lingheath site. The innermost (westerly) earthwork follows the line drawn on the 1838 Tithe plan (SRO T125/1), however the outer (easterly) bank is straighter, corresponding to the line drawn on the Ordnance Survey maps from 1882 onwards. Pearson suggests this “shift” was initiated to “bring more ground into the ownership of the Lingheath Trust to accommodate extra shafts,” Five mines have been identified in the space between the two banks, while four more shafts were sunk beyond the parish boundary (ibid. 15). This might also explain why the area of the allotment had increased from 176a 24p in 1807 to 183a by the end of the 19th century.

Approximately 22ha of flint pits were levelled on Lingheath as a result of post-World War II agricultural ‘improvements’ although the RCHME Field Survey Report found that a further 26ha of earthworks have survived within stretches of mixed woodland to the north, west and south (ibid. 2)

Ploughed out pits visible on aerial photographs (106G/UK/155Y/4007-8) within the cultivated area to the north of the surviving earthworks clearly indicate that the mining complex extended further in that direction, the boundary of the Lingheath Trust land being marked in the north by a linear earthwork consisting of two parallel banks, in the north east by two boundary earthworks of different date and in the east by the parish boundary (ibid. 6)

There are marked differences in the arrangement of mine shafts within the Lingheath site; those to the north-west forming a random “honey-combed pattern of tightly packed pits” (see Fig. 2 – “Lingheath showing the principal components of the monument” - Pearson 1996,6) which contrast with those in the south and east whose “horse-shoe” shaped spoil heaps are more prominent and widely spaced (the shafts themselves being generally between 10-15m apart), and those in the south-west corner of the site which are approximately 5m apart and disposed in rows (ibid. 7).

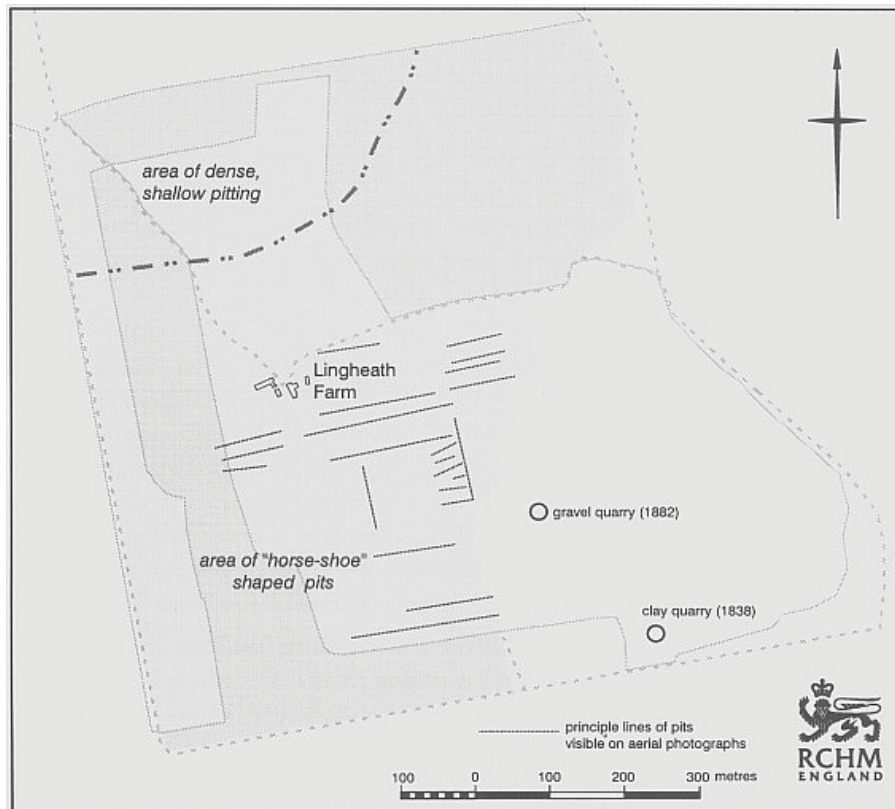


Figure 15 Principle Components of Lingheath Flint Mine Complex

The best preserved earthworks are to be found within the north-east corner of the site, in an area named “Trees and Old Stone Pits” in the Tithe Apportionment (SRO T125/2), and where a system of boundary banks and route ways, that post date the pits, have also survived (ibid. 10), while a range of surviving chronological evidence can be found in the north-west corner. It is here that the well preserved remains of a medieval hollow way can be found; the entire site being bounded by earthworks that correspond exactly to the line marking the full extent of the Lingheath ‘Poor’s Allotment’ as drawn on both the 1809 Enclosure map (SRO Q/RI8) and the 1838 Tithe plan and which probably dates from the time of enclosure.



Fig. 16 1809 Brandon Enclosure Map showing the Poor's Allotment for Fuel, Lingheath Farm.

The fact that all the mine shafts observed in the Field Survey Report post-date and yet lie within the boundary banks of the Allotment suggests that either pre-enclosure mines were included within the Allotment or that all shafts within the boundary earthworks were opened post-enclosure, a useful point to consider when attempting to determine a likely date for the commencement of mining on Lingheath. However, cropmarks visible outside the Allotment's northern boundary might indicate an area of "pre-enclosure mining flint extraction, which was excluded from the land parcel allocated to the Lingheath Trust" (ibid. 16). While a closely packed array of 'pits' in the north-west corner show a slightly different, perhaps earlier phase of mining technique, possibly akin to that used at Grime's Graves, which, due to lack of space would have required a random arrangement of underground burrows, instead of the geometric, 36ft long galleries described by Skertchly. Of course, it is possible that these marks simply relate to the extraction of other materials from the heath such as sand, clay or gravel, or the quarrying of flint, rather than mining activity.

A J Forrest describes 'outlines' or 'cavities' visible in the south wall of the vast 'Taflins' chalk pit (a trapezoid shaped plot north of Lingheath but still on the southern side of the Thetford Road) which he ascribes to mining activity (Forrest 1983, 13). He also indicates that there were five or six pits lying just outside the eastern boundary of Lingheath, within Forestry Commission land. Perhaps these are the same pits that, as previously mentioned, lie just across the parish boundary in Santon Downham.

Mining for flint

Brandon's stone diggers used four pieces of basic equipment - a one-sided pick, a heavy iron hammer, a shovel and a short crowbar.

Working individually the digger would mark out and sink his own pit from which he would raise the stone with only occasional assistance from a boy or two; usually his own offspring (Skertchly 1879, 21). There was an element of speculation with the opening of each new pit, some being more productive than others. A single pit might produce between two and five 'jags' of stone in a week (a 'jag' being the unit of sale which Skertchly estimated as being equivalent to a one-horse cartload or approximately one ton (1879, 25) although Forrest defines a 'jag' as around 13cwt or one and a half cartloads (1983, 18), potential productivity being the criterion uppermost

in the mind of every digger when deciding where to sink his next shaft - factors such as proximity to other workings and a warm, dry position, perhaps among trees, being but secondary influences on his choice of site (Skertchly 1879, 21).

Over the course of six days a miner in a reasonably productive pit could hope to raise around 3½ jags, the flint being brought up in lumps of between 1½ to 2ft and piled around the mouth of the pit. To protect the lustrous black flint from the effects of sun and wind the excavated flint would be covered with dried bracken and fir-boughs (ibid. 25).

As flint digging was a year-round activity, in summer, proximity to other shafts could be turned to the digger's advantage when the joining of two pits would create a pleasant circulation of air. The extent of the workings being "determined by the labour required to carry out the stone got in a day; they seldom run more than 12 yards in any one direction" (ibid. 22).

Skertchly estimated that it took approximately 3 weeks to dig 30 foot pit although Pearson reports that the much prized 'floorstone' could be found at a depth of around 40ft (12.1m) at Brandon, with many diggers starting a second shaft before the first was worked out to ensure a steady income. However, Forrest believed that it would take only one week to sink a shaft the forty or fifty feet required to reach the 'floorstone' (Forrest 1983, 22).

Once permission had been granted by the Trustees for the digging of a new pit its position was marked out at the four corners with either lumps of chalk or by cutting four pieces of sod. One of the laws of stone-raising was that no digger was to have more than two open pits and one set of marks at any one time. However, once marked a pit might remain unexploited for months (Skertchly 1879, 22). Nor could he burrow more than halfway towards the nearest pit, most new shafts being commenced at least 120 ft way from the old pit head (Forrest 1983, 22).

Beginning with a trench three yards long by one yard wide and one yard deep (the long sides running north-south so that the last stage faced the midday sun, the shaft would proceed downwards in stages of approx 5 feet in alternate directions, and just large enough for a man to work in. An incline undercutting approximately 2 yards in 30 feet would help to prevent injury from any loose stones falling from above (Skertchly 1879, 22-23). No timber supports were used; nevertheless roof-falls were an infrequent occurrence.

Once the much prized floor-stone had been reached a slanting gallery would be excavated beneath the flint for about one yard before being properly dug out, and when this layer of stone had been exhausted the pit might be filled in up to the level of the wall-stone which could then be extracted (Skertchly 1879, 24). Then the remainder of the pit would be backfilled, using chalk from the spoil heap, which had grown in huge arcs around the opening of the pit - although this filling has a tendency to subside, particularly after heavy rain, the most serious recent occurrence being in the winter of 1995-6 (Pearson 1996, 5).

Routeways and tracks within the mines complex area offered as physical evidence of organisation and planning during certain phases of exploitation on the heath (Pearson 1996, 17). For all the famed independence of the solitary digger, towards the end of the Napoleonic Wars, when as many as 75 pits might have been open on the heath simultaneously (out of an estimated total of around 2000 shafts) such a large scale operation could not have been successful without a certain amount of regulation. This might explain the regularity in disposition displayed by pits on some areas of the site. Mason suggests that "care was taken by the trustees to ensure that each miner had his fair share of the available land" (2000, 15) with a good pit lasting from 6 - 9 months.

By the 1930s mining methods as described by Hewitt were noticeably different from those recorded by Skertchly half a century earlier (Barber *et al*,22).

History of the industry

Although there is almost no evidence of what the land at Lingheath was used for before flint mines were opened on the heath the existence of the hollow way leading to what was largely an area of unproductive soil suggests that it was possibly used as a rabbit warren (Pearson 1996, 15)

A J Forrest wrote of Lingheath Farm:

Its surface was once riddled with shafts sunk by lone miners, each dug laboriously with spade and single-pronged pick and banked by chalk and stone debris. Having hauled out all procurable black flint, miners partially filled in their pit openings or blocked them up with brushwood, but more often abandoned them, unstopped, for each crescent shaped crater to add a fresh scar to a barren perforated wasteland. (1983, 13)

And, as Pearson points out, “the persistence of the horse-shoe shaped spoil heap.... indicates that techniques hardly changed during the timespan of the site, emphasising that it was an industry based on tradition” (Pearson 1996, 16)

As mentioned above, during the boom time of the French Wars, when Brandon’s knappers could be turning out more than 1,000,000 gunflints a month there may have been as many as 75 stone diggers working on the heath at any one time. Yet the British victory at Waterloo, brought depression to the industry and by the early 1820s, knapping shops were being installed in the parish workhouse, with wages for those knappers and diggers still in employment being so low they often had to be supplemented by alms from the parish (Forrest 1983, 73).

In 1821, in an attempt to regulate operations on the heath, the Select Vestry of the Parish Church of St Peter decided to go into the gunflint business. They set up a committee to organise the raising of the stone and its sale to the flint masters, seven of whom signed up to work exclusively for the Vestry (*ibid.* 69).

However, overproduction and a lack of orders eventually led to one particular Brandon and London merchant by the name of Burgon achieving a virtual monopoly in the purchase of Brandon gunflints. In an attempt to counteract this the flint masters joined together to form the Brandon Joint Stock Gunflint Company, which sold shares At £25 apiece and operated between 1837 and 1849 (SRO HC 506/1-20).

Large orders did come in intermittently, and were snapped up by the now independent flint masters. However, by the latter half of the 19th century the industry was in slow but steady decline. Skertchly notes that in 1868, 36 men (not including the stone diggers) were regularly employed by 3 flint masters but maintains that the fall off in numbers was in no way due to any fall in demand for gunflints but instead reflected the reluctance of young men to enter a the trade, preferring outdoor agricultural employment or work in one of the fast-growing fur factories in the town (Skertchly 1879, 5; Clarke 1935, 52). At this time the Brandon knappers were “turning out 23 sorts of gunflints, as well as strike-a-lights and faced cubes for ornamental work,” but the low prices paid for their product meant that life was particularly harsh for the knappers and stone-diggers of Brandon and the future of the industry remained perpetually in doubt (Forest 1983, 91).

Ten years later, in 1878, just 26 men and boys were working in 4 knapping shops, several of them knapping only at night, having been employed in other jobs during the day, and only 5 men and 5 boys were actively raising the stone from the heath, necessitating the importation of flint from Norwich on occasion (Skertchly 1879, 5).

By 1891 the Trustees had leased Lingheath Farm for £55 to William Rought, the leading rabbit fur manufacturer in the town; “He also paid £30 for the groundage of flint and chalk withdrawals (Forrest 1983, 15).

By the end of the century, demand for gun- and building-flints may still have been exceeding supplies but paradoxically the industry continued to contract. There were only two flint pits open in 1937 when Clarke observed operations on the heath (Clarke, 1937, 119). They had been sunk on the south-east of the site, and were no doubt among the last worked there (Pearson, 1996, 4). Regular mining on Lingheath ended not long afterwards but part time flint extraction continued on an ad hoc basis after the Second World War only ceasing permanently in the 1950s when agriculture and the plantations of the Forestry Commission presented a more profitable use for the land.

Even then, the town’s several chalk pits along the Thetford Road continued to produce small amounts of flint as a by-product of their extraction activities. Chalk was excavated for use as fertiliser (marl) and for the production of lime (particularly for mortar). It had long been ground into powder at the four whiting mills in the town (White’s *Directory of Suffolk*, 1855) and was also occasionally used as building stone.

INTERPRETATION OF MAP EVIDENCE

The corridor of the proposed bypass route passes through, and at some points along, the boundary between the parishes of Brandon and Santon Downham, Suffolk (see Map 1)

Ordnance Survey

The earliest OS map held by the British Library upon which Brandon and Santon Downham appear is the First Edition of the 1-inch (sheets LXV [1824] and LI [1836]). While the Lingheath flint pits are indicated on this map, no evidence of flint mining or other extraction activities were noted that do not appear on the later maps examined.

The early 20th century Ordnance Survey 25” series was used as an intermediate point between the modern map supplied by the Suffolk County Council Archaeology Service Conservation Team and the 19th century maps consulted.

In all the following maps were used:

1882-4, 25” series (1882, sheet XIII.1 [surveyed 1881]; 1882, sheet XII.4 [surveyed 1881]; 1884, sheet VII.13 [surveyed 1881& 1883];)

1905, Second edition, sheet XII.4 Suffolk (West)

1928, Edition, sheet VII.13 [Norfolk surveyed, 1882; Suffolk surveyed 1880; both revised 1926]

1928, Edition, sheet XIII.1 Suffolk (West) [Surveyed 1880, revised 1926]

1928, Edition, sheet VII.14 [Norfolk surveyed, 1882; Suffolk surveyed 1880; both revised 1926]

Features of interest were noted and all forms of extraction activity indicated.

VII.13 a (See Map 3) – 2 Old Gravel Pits; one to the south of the Taflins Plantation (at the very bottom edge of the map) and the other just north of the Thetford Road
- 1 Old Chalk Pit on the south of the Thetford Road, south-east from the Downham Hall gate lodge.

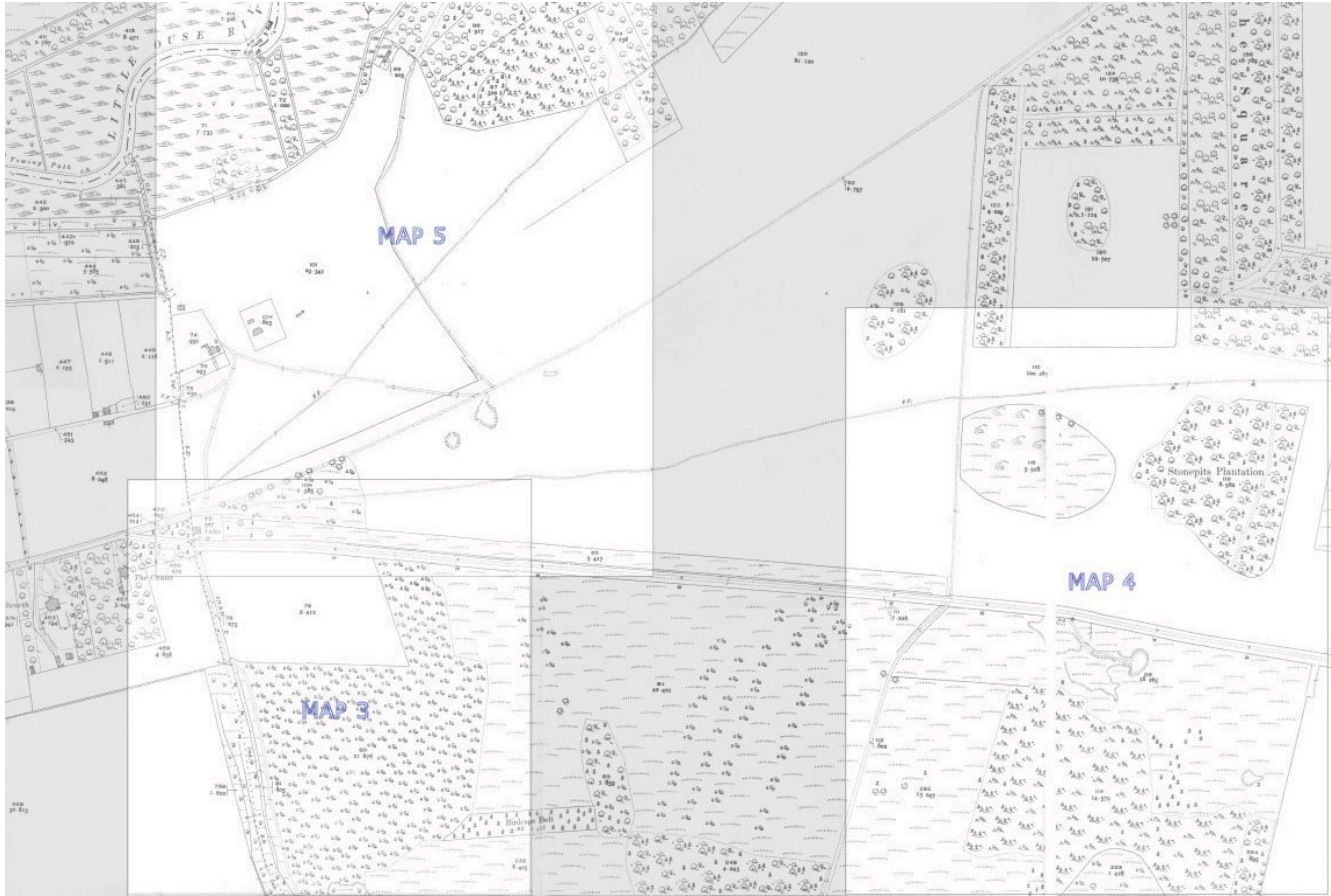
NB The plot of land marked 79 would later become the site of the Taflin’s Chalk Pit and Lime Quarry.

VII.13 b (See Map 4) - 2 Gravel Pits to the south of the Thetford Road

NB The Stonepits Plantation can be seen to the north-east

VII.13 c (See Map 5) - 1 Old Chalk Pit and 2 Gravel Pits to the north of the Thetford Road

NB The Old Chalk Pit and the southernmost Gravel Pit are the same as those indicated on Map 3.



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Figure 17 Map 2 - 1928, Edition, sheet VII.13 (Key to details)

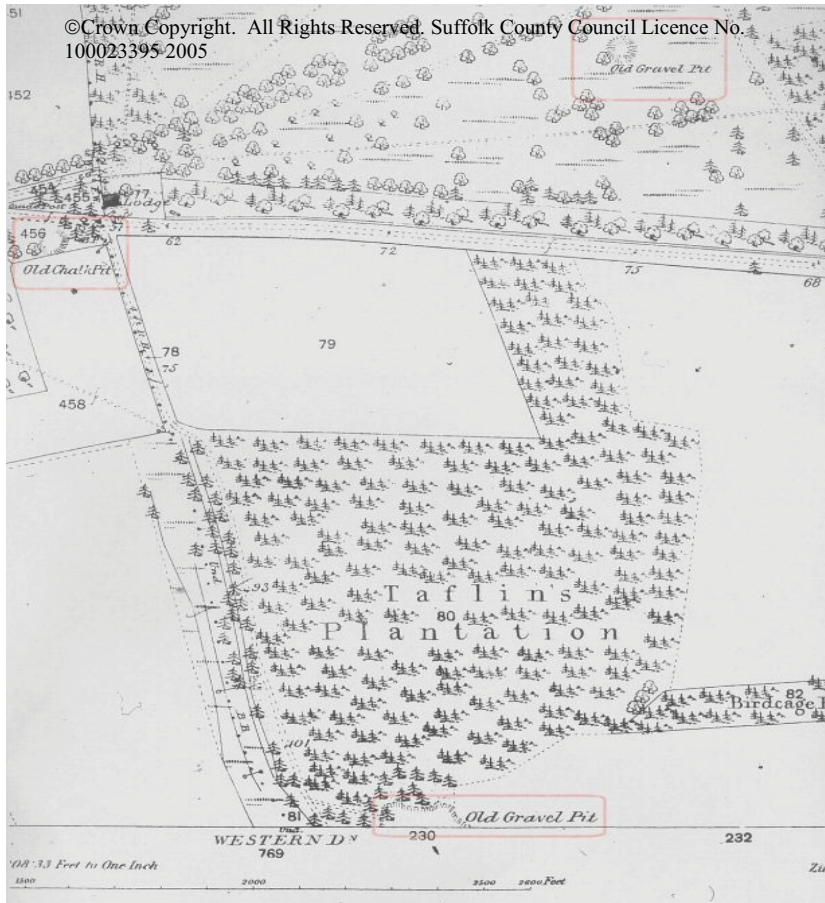


Figure 18 Map 3 - Detail: OS Map 7.13 , 1884 (Surveyed 1881 & 1883)

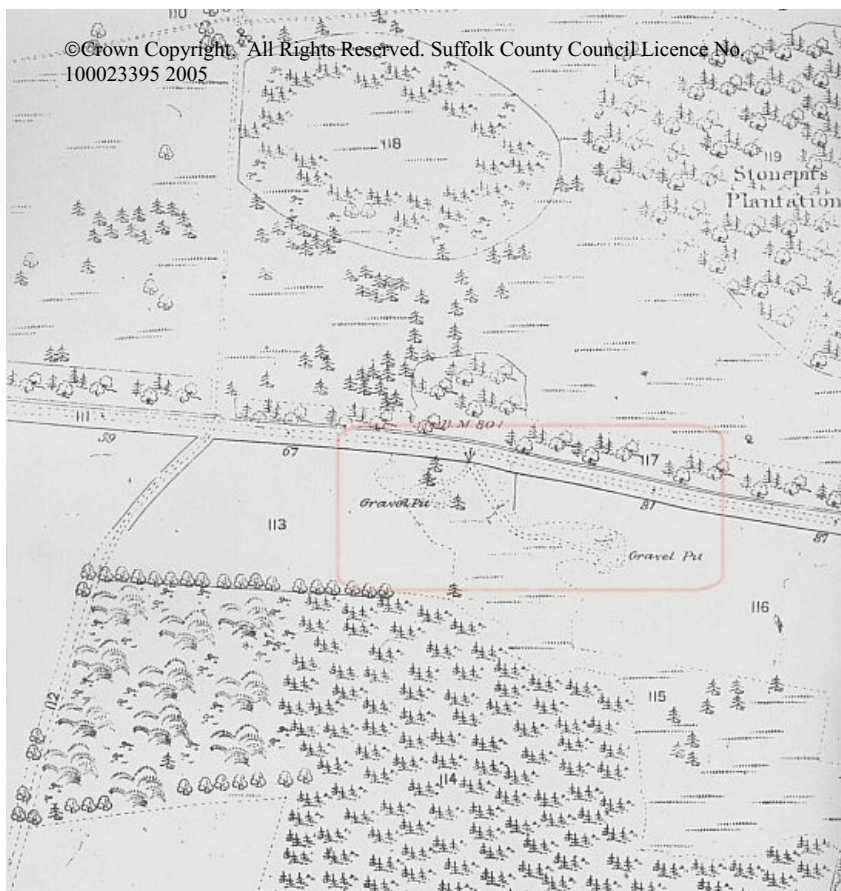
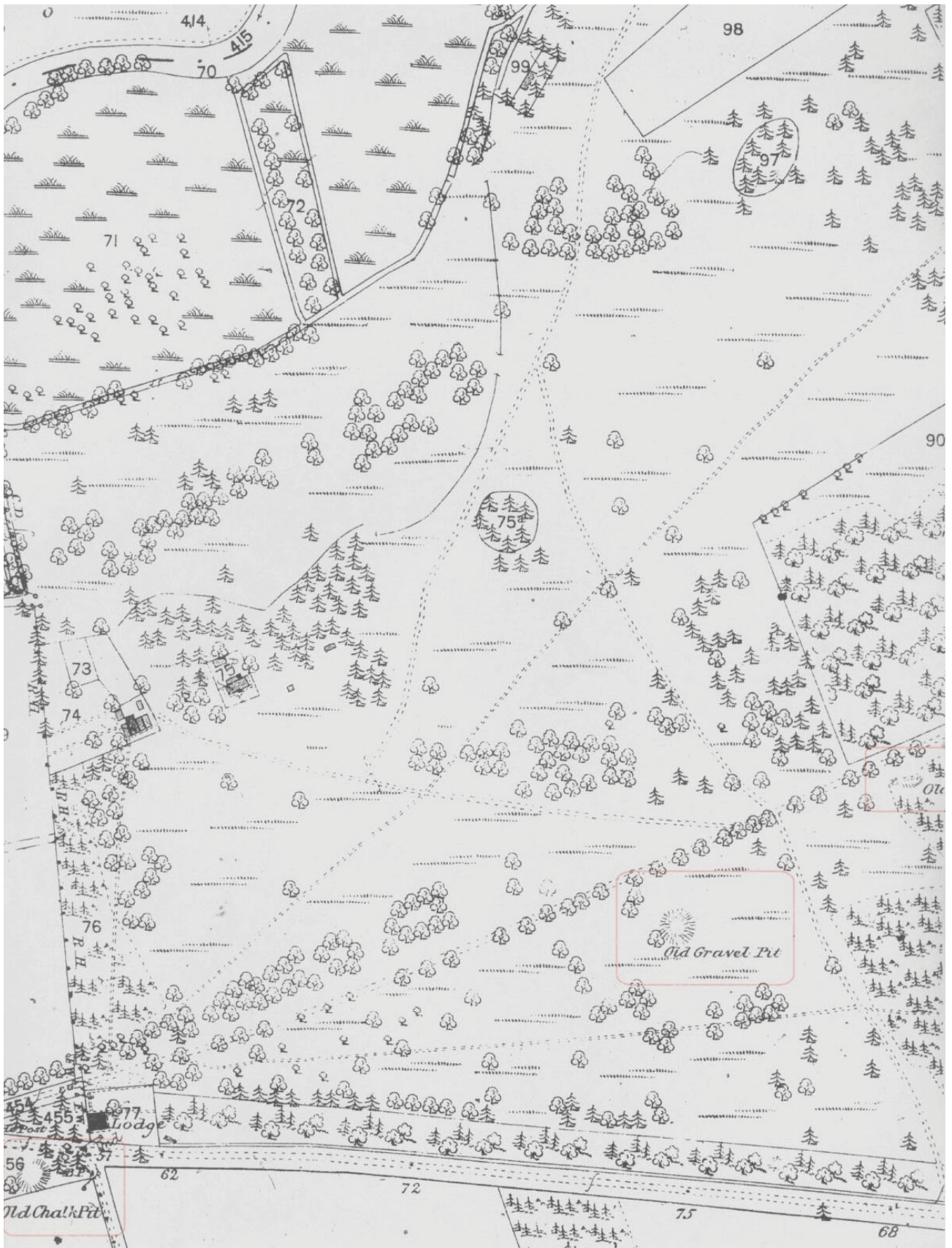


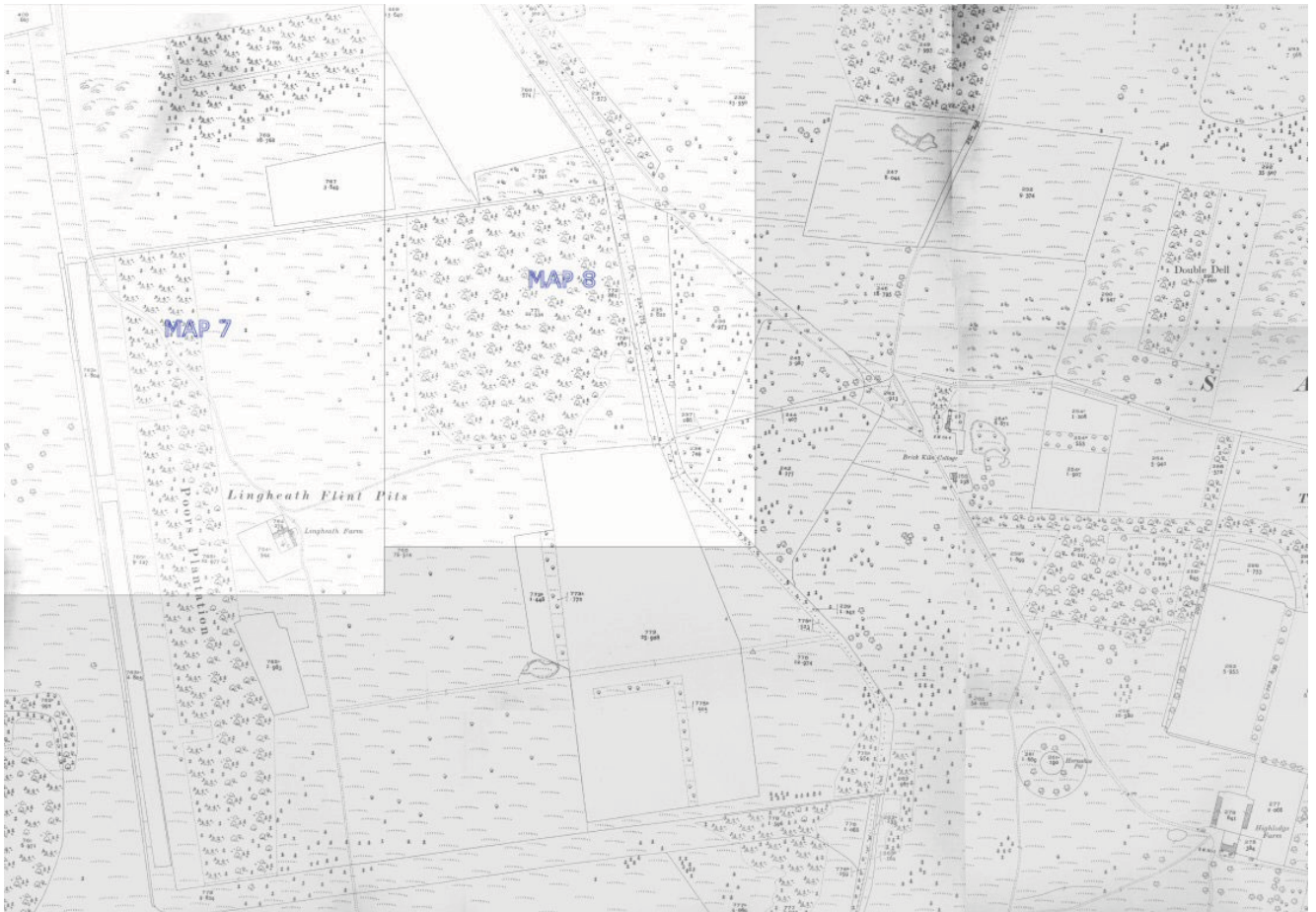
Figure 19 Map 4 - Detail: OS Map 7.13 , 1884 (Surveyed 1881 & 1883)



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Figure 20 Map 5 - Detail: OS Map 7.13, 1884 (Surveyed 1881 & 1883)

XIII.1 (See Maps 7 & 8) - The area to the north of Lingheath farm



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Figure 21 Map 6 - 1928, Edition, sheet XIII.1 (Key to details)



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Figure 22 Map 7- Detail: OS Map 13.1, 1882 (Surveyed 1881)



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Figure 23 Map 8 - Detail: OS Map 13.1, 1882 (Surveyed 1881)

XII.4 (See Map 10) – 1 Old Chalk Pit to the east of the Bury Road, close to the junction with Rattlers Road.

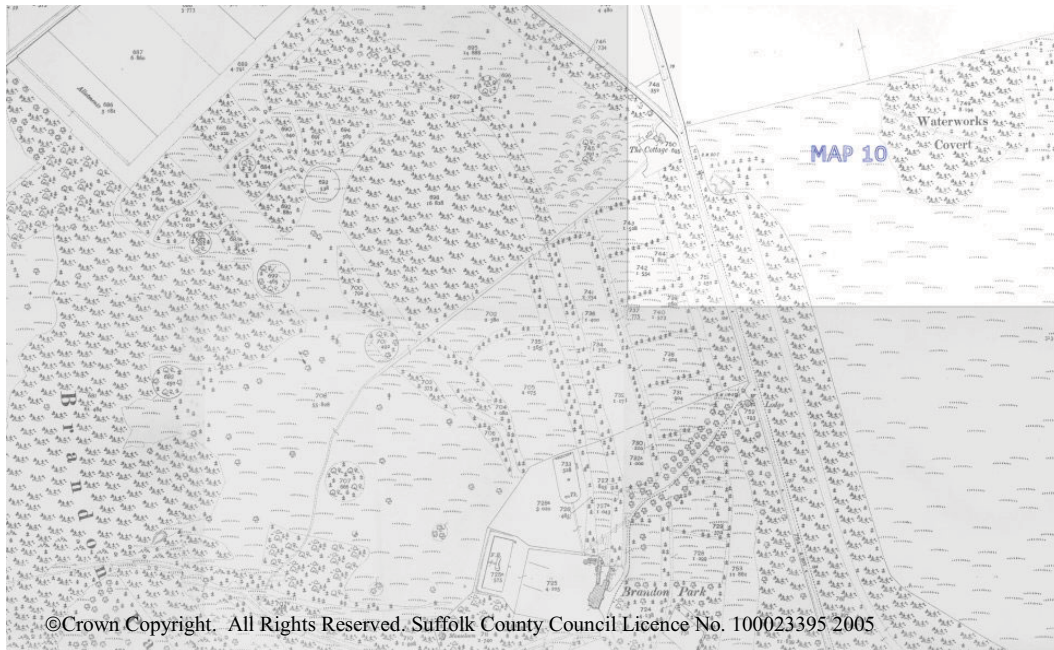


Figure 24 Map 9 - 1905, Second edition, sheet XII.4 (Key to details)



Figure 25 Map 10 - Detail: OS Map XII.4, 1882 (Surveyed 1881)

Also examined: a 2" to the mile Ordnance Survey Surveyor's drawing dating from 1817, sheet 198 (see Map 11). Badly marked there was, unfortunately, insufficient detail to form any strong conclusions however it is interesting to note the early existence of the Stone Pits Plantation between Downham Hall and the Thetford Road, as well as the position and extent of wooded areas at that time. The area of the Lingheath Farm 'Poor's Allotment' can also be discerned to the west of Downham Lodge.



Figure 26 Map 11 – Detail: Ordnance Survey Surveyor's drawing of 1817, sheet 198

Enclosure plan and award

At the time of the Award of 15th Feb 1810, when all the open land in the Parish was divided and enclosed, Brandon was dominated by two major landowners: Joseph Randyll Burch (a local magistrate and farmer) and George Wilson (1756-1826), Admiral of the Fleet. Wilson had inherited, through marriage, Redgrave Hall, in Suffolk and also lands in Brandon (along with the title of Lord of the Manor) from the Holt family. In 1807, when the Brandon Enclosure Award was made, most of the land we are concerned with in Brandon Parish (namely, that which would later become the Brandon Park Estate) belonged to George Wilson. A tiny part belonged to local merchant, James Denton (FL536/7/131, Articles of Agreement), but perhaps the most significant allotment from the point of view of this study was the 'Poor's Allotment' on Lingheath.



Figure 27 Taken from 1809 Brandon Enclosure Map

A piece of the warren (or heath) measuring 176a 24p, and contained within the newly enclosed estate of the Lord of the Manor, George Wilson, was to be held in trust for the poor of the parish. Although little would grow on this virtually barren wasteland, Brandon's flint mining activity now centred on this area. As a Norfolk Museums Information Sheet (Flint, 1982, 3) tells us, "special provisions dealing with mining rights were included in the Act" (Pearson 1996, 3).

The 'Poor's Allotment', part of a larger 'Poor's Estate' that spread throughout the parish, was to be managed by the newly formed Lingheath Trust (made up of the Lord of the Manor, other principal inhabitants, the minister, church wardens and overseers of the poor). The revenue accrued from the leasing of parts of the heath and the groundage or royalty paid on stone raised there was to be used to purchase fuel for the poor folk of Brandon who, by the Act of Enclosure, had lost the right to gather it freely from the commons and wastes that were no more.

By contrast, the parish of Santon Downham had been a single estate since 1804. It was formally enclosed in 1844 but no enclosure map is known to be in existence. However, at the time of Brandon's enclosure, the Downham Hall estate was in the hands of Charles Sloane, Lord Cadogan and a 1791 copy of an original 1785 plan of his estate survives (SRO M 550/3). While it can tell us nothing of flint mining on the estate, field names such as Marlpit, Gravel Pitt, Brick

Kiln and Limekiln Brakes, clearly demonstrate that there had been significant levels of extraction activity there.

It seems unlikely to have been purely coincidence that in 1790 Lord Cadogan's cousin, Charles Lennox, the 3rd Duke of Richmond and also (from 1782 to 1795) Master-General of the Ordnance, turned to East Anglia for the first time to supply the Tower of London with high quality gunflints, knapped from a type of lustrous black flint which, it just so happened, could be found in abundance on his relative's Suffolk estate (Forrest 1983, 55). Perhaps the sinking of a well or some quarrying activity in the vicinity of Downham Hall had brought this fine black flint to Lord Cadogan's attention, and he in turn may have alerted his cousin to the discovery. The 1791 Estate Plan shows two gravel pits and a marl pit on the estate and in 2003 an archaeological forest survey conducted by the Suffolk Archaeological Service uncovered flint pits that may pre-date those at Brandon (Annual Report, 2002-3, 5)

Tithe plan and apportionment

In 1838 a plan of landholding in the Parish of Brandon was drawn up by W H Young (a surveyor from nearby Mildenhall) to accompany the 1838 Brandon Tithe Apportionment (SRO T125/1,2) by which the traditional tithes were officially and legally commuted to cash rental payments (although in many parishes this had already happened by agreement). The plan shows the location of numbered plots of land which reference correspondingly numbered entries in the Tithe Apportionment, that detail ownership, occupation, area, tithable value and, most importantly for this study, land use (see Appendix 2). Primarily concerned with the assessment of financial liabilities, tithe maps generally prove to be a poor source of information regarding earthwork sites, although the accompanying apportionment can yield much of interest; and while the flint pits of Lingheath and elsewhere are not indicated on the map, other extraction operations such as clay, gravel and chalk quarries are; both of these features can be identified within the Lingheath allotment at that time.

The plots within the area under examination were, in 1838, in the possession of Lord William Powlett (then owner of the Downham Hall estate, Santon Downham, Edward Bliss Esq. (owner of the Brandon Park estate and Lord of the Manor of Brandon, the majority landowner at that time) and the Brandon Lingheath Trust ('Poor's Allotment') the Trust land being occupied by Benjamin Shepperson, who was at that time clerk and supervisor for the Brandon Joint Stock Gun Flint Company (Pigot & Co *Directory of Suffolk*, 1839).

The history of the Poor's Allotment has already been discussed when examining the Enclosure Map of 1809 and it is known that flint extraction was being carried out on at least part of this plot of land at that time. The Tithe Apportionment lists two areas of 'stone pits' as well as arable and heath land. Yet, for all their shared history of flint extraction, both the Downham Hall and Brandon Park estates, had become gentlemen's 'shooting estates', a feature typical of the Breckland area in the 18th and 19th centuries, it being so rich in game, while at the same time such a poor environment for agriculture; although the continuing excavation of sand, chalk and gravel is likely.

Edward Bliss Esq., who first appears in the written records of the town in 1814 Brandon Poor Rate book as a tenant of the previous Lord of the Manor, Admiral George Wilson, had, by 1822, become Lord of the Manor and owner of the Brandon Park estate. The Poor's Allotment at Lingheath fell within the bounds of this estate and, less than a year after becoming Lord of the Manor, Bliss was in dispute with the Trustees who, in a time of great want in the parish, had proposed to increase their income by leasing the heath's shooting rights. Claiming 'right of free

warren' and expressing outrage that such a venture could be contemplated in the middle of his estate, he opposed the plan (SRO FL 536/11/9 - Letters from Solicitors acting for Mr. Bliss).



Map 12 - Detail: 1838 Tithe Plan

Figure 28 1838 Tithe Plan

As with the Enclosure Award, and probably for similar reasons, no tithe plan has been deposited for Santon Downham although it is known that the major function of the estate was to act as a 'shooting lodge' for its owner, Lord William Powlett.

INTERPRETATION OF DOCUMENTARY EVIDENCE

Despite the wealth of surviving documentary evidence from both the Select Vestry: Gunflint Committee (SRO FL 536/1/54-78) and the Brandon Joint Stock Gun Flint Company (SRO HC/506/1-20) largely in the form of minute, letter and work books, there is very little in the way of information either with regard to the organisation of the extraction of flint or indeed the identities of the stone-diggers themselves.

Concerned primarily with the production rates of the knappers and the sale of the finished products only brief mention is made of payments to diggers (SRO FL 536/1/55, 56, 59) or, for instance, of a plan to erect buildings (a supervisor's house and adjacent warehouse) at Ling Heath (SRO FL 536/1/70). Various changes in supervisors, different methods for calculating the quantities of stone raised including suggestions regarding weighing machines are recorded, but there is no indication of the extent of the flint mining activity as it was organised on the ground, or whether mining occurred elsewhere in the vicinity. Even so the disposition of some mines on Lingheath, where in some areas uniform lines of pits can be seen, suggests that the otherwise

solitary miners heeded some controlling authority and were mindful of safety considerations and mining law.

One way that the Trustees of the Poor's Allotment at Lingheath could increase their revenue was by leasing out portions of the heath. On the 30th of December, 1819, new 7 year leases were signed by three Brandon men: John Snare of Brandon, gunflint maker (25 acres for £10 a year); John Utting of Brandon, innholder (and later to enter into the flint trade; 25 acres at £9 7s 6d a year) and George Ashman, yeoman (12.5 acres at an annual rent of £5 SRO FL 536/11/8), and advertisements were produced that publicized the letting of charity lands by auction (SRO FL 536/11/18).

Other papers of potential interest are the "Drafts, papers, abstracts and correspondence relating to property sold by A W Rought Rought to the Forestry Commission in 1930 (HA 536/CD 13-27) which includes the lease by A W Rought Rought of the Ling Heath estate (in the lease of this farm a right is reserved to the trustees of opening pits on a certain portion of it) and a Map of the Santon Downham estate (which was also purchased by the Forestry Commission). However, the latter is taken directly from the OS 25" series map and contains no new information other than marking the boundary of the estate. Rought Rought had purchased much Brandon Park land from J B Kind Ltd in 1922 (the land to the east of the Bury Road, and land between Bury Road and London road) He had also acquired from National Bank Ltd, a strip of land in Santon Downham against the Brandon Parish boundary (HA 536/CD 27)

Within this bundle, SRO Ref: HA 536/CD 24 1937 - Abstract of Title of British Farm Lands Limited to the Freehold property known as the Downham Hall estate, lists the following features (the numbers relate to a plan which unfortunately is no longer amongst the papers)

64 Horse Shoe Pit

125 Pits

137 Taflins

376 Plantation and pit

176 Old Stone Pit Plantation

119 Pit

141 Pits and Trees

Turning next to the records of the Ordnance Survey, an 1880 Perambulation of the Boundaries (PRO OS 26/9861, Suffolk) failed to yield any new information, and similarly an 1882 Boundary Sketch Map (PRO OS 27/3610) offered nothing of interest to this study.

A particularly fruitful source of information promised to be found amongst the papers of the late Mr. Seymour de Lotbiniere. Brigadier-General Joly de Lotbiniere had purchased Brandon Hall shortly after the First World War, and his son Seymour soon became intrigued by the town's knapping industry. When the Brigadier-General died the Hall passed out of the family, but Seymour de Lotbiniere bought it back in 1968. On his retirement from the BBC, where he had been Director of Outside Broadcasts and later a Television Controller he undertook a thorough study of gunflints worldwide but particularly those manufactured in Brandon.

A. J. Forrest relates that Mr. de Lotbiniere "built up an archive of photographs, maps and diagrams covering more than a century of localised flintcraft, knapping procedures, technical equipment, the layout of the town's main flintworks and mining at Lingheath," (Forrest 1983, 100). And yet an exhaustive examination of the 10 boxes of the de Lotbiniere papers held by the Cambridge Museum for Archaeology and Anthropology failed to unearth the maps referred to. Correspondence with the Lotbiniere family is ongoing and it is hoped that eventually the maps, plans and diagrams, if they are still in existence, might come to light.

The Lotbiniere papers (G02/12) do, however, provide a very interesting chronology for the development of the flint mining industry in the Brandon area

Brandon Story

- 1575-1790** *Strike-a-lights and wedge type gunflints*
1790-1800 *a) Discovery of floorstone
b) Arrival of platform technique
c) Wellington's armies need gunflints*
1790 - 1800 *7 flint knapping families move to Brandon Curson (Kent?), Frewer (Bury St Edmunds), Grief (Norwich), Hayward (Kent via Bury St Edmunds), Rissbrook (Bury St Edmunds via Thetford, Kentford and Santon Downham), Utting (Norwich), Wood (Kent via Bury St Edmunds and Thetford)*
1813 *Heyday of gunflint industry*
1815 *Waterloo*
1821 *Gunflint making in the workhouse*
1825-1840 *John Burgon, London Hardware merchant dominates Brandon gunflint trade*
1839 *Army abandons the Flintlock*
1838-1848 *Brandon Gun Flint Company formed by flintknappers to fight Burgon's monopoly
- in the end both companies go bankrupt*
1850-1950 *Development of the export market – Africa, South America, etc.*
1950 *Growth of muzzle loading clubs and widening of interest in Flintlocks creates new market*

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- 1817 Ordnance Survey - Surveyor's Drawing , sheet 198, British Library
- 1838 Tithe map and apportionment (SRO T125/1,2)
- 1880 Perambulation of Boundaries (PRO OS 26/9861, Suffolk)
- 1882 Boundary Sketch Map (PRO OS 27/3610, Norfolk)
- Ordnance Survey Sheet XCII.16 1ST Ed 25" County Series, Norfolk & sheet VI.16 1ST Ed, Suffolk (British Library)
- 1882-4, 25" series (1882, sheet XIII.1 [surveyed 1881]; 1882, sheet XII.4 [surveyed 1881]; 1884, sheet VII.13 [surveyed 1881& 1883];)
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Advertisement - auction of letting of charity lands, FL 536/11/18, Suffolk Record Office, Bury St Edmunds

De Lotbiniere Papers, The, G02/12, Cambridge Museum of Archaeology and Anthropology, Cambridge

Drafts, papers, abstracts, correspondence relating to property sold by A W Rought Rought to the Forestry Commission in 1930. Sale of Land to FC by RR, and lease of Ling Heath Estate and Map of SD estate [taken from OS but gives outline], HA 536/CD 27/13-27, Suffolk Record Office, Bury St Edmunds

Leases by the Trustees of the Poor's Allotment, Lingheath to:

- a) John Snare of Brandon gunflint-maker 30th December 1819
- b) John Utting of Brandon, innholder (also flint master) 30th December 1819
- c) George Ashman of Brandon, yeoman 30th December 1819

FL 536/11/8, Suffolk Record Office, Bury St Edmunds

Letters from solicitors acting for Mr. Bliss within whose estate Ling Heath lies, opposing proposal to let sporting rights over Lingheath FL 536/11/9, Suffolk Record Office, Bury St Edmunds

Records of the Brandon Gun Flint Company HC 506/1-20, Suffolk Record Office, Bury St Edmunds

/9 Work Book No2 1838-1839

/16 Minutes of Director's meetings 1838-1843

Rough notes concerning the gunflint industry c.1960s Poor's Allotment: Lingheath FL 536/1/78, Suffolk Record Office, Bury St Edmunds

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Appendix A

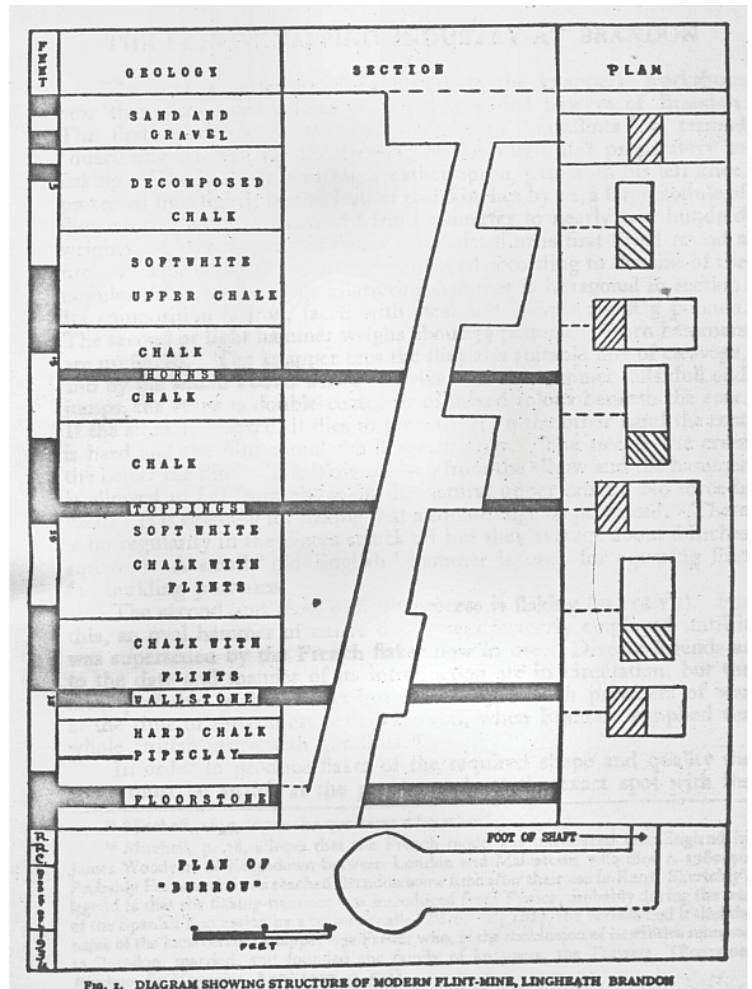
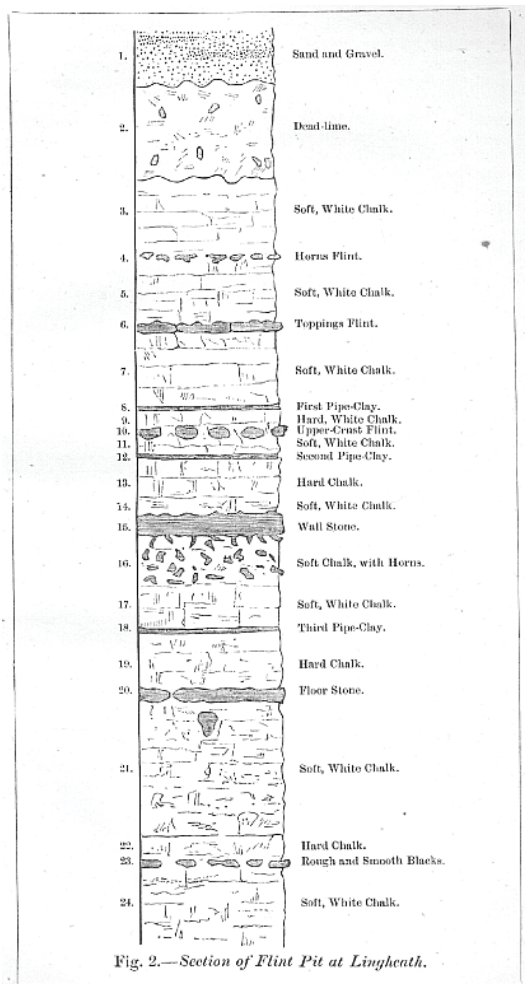


Fig. 29

Geological sections through a 'typical' Lingheath Flint Mine: LH - Skertchly 1879;
RH - Clarke 1935

Appendix B

<i>Landowner</i>	<i>Occupier</i>	<i>No.</i>	<i>Name</i>	<i>Use</i>	<i>a</i>	<i>r</i>	<i>p</i>
POWLETT Lord William	Himself	688	Plantation	Wood	11	0	30
BLISS Edward Esquire	Himself	775	Home Paddock	Grass	1	3	38
BLISS Edward Esquire	Himself	849	Plantation	Wood			7
BLISS Edward Esquire	Himself	850	Plantation	Wood			12
BLISS Edward Esquire	Himself	854	Plantation	Wood	10	3	2
BLISS Edward Esquire	Himself	860	Porters Lodge				22
BLISS Edward Esquire	Himself	861	Drift	Heath	5	1	30
BLISS Edward Esquire	Himself	867	Paddock	Pasture		3	19
BLISS Edward Esquire	Himself	868	Paddock	Pasture	2	2	
BLISS Edward Esquire	Himself	886	The Park	Heath	197	2	17
BLISS Edward Esquire	Himself	888	Stone Lodge Heath	Heath	144	2	2
BLISS Edward Esquire	BALDWIN	889	Taflins Breck	Arable	6	1	37
BLISS Edward Esquire	CARTER	891	Mill Hill	Arable		1	9
BLISS Edward Esquire	BALDWIN	893	Taflins		31	1	31
BLISS Edward Esquire	Himself	894	Furze Covert	Furze	9	3	10
BLISS Edward Esquire	Himself	895	Taflins	Arable	20	1	12
BLISS Edward Esquire	Himself	895	Taflins	Heath	1	3	14
BLISS Edward Esquire	Himself	896	Taflins Heath	Heath	24	3	3
BLISS Edward Esquire	Himself	897	Broom Covert	Broom	8		5
BLISS Edward Esquire	Himself	898	Taflins Heath	Heath	16	2	3
BLISS Edward Esquire	Himself	899	Taflins Breck	Arable	13		19
BLISS Edward Esquire	Himself	899	Furze Covert	Furze		1	38
Brandon Lingheath Trust	SHEPPERSON Benjamin	900	Trees and Old Stone Pits		15	1	15
Brandon Lingheath Trust	SHEPPERSON Benjamin	901	Stone Pits		14	2	14
Brandon Lingheath Trust	SHEPPERSON Benjamin	902	Trust Land		42		13
Brandon Lingheath Trust	SHEPPERSON Benjamin	903	Trust Heath		22		3
Brandon Lingheath Trust	SHEPPERSON Benjamin	904	Clay Pit				12
Brandon Lingheath Trust	SHEPPERSON Benjamin	905	Ling Heath		19	1	31
Brandon Lingheath Trust	SHEPPERSON Benjamin	906	Drift			1	38
Brandon Lingheath Trust	SHEPPERSON Benjamin	907	Land		7	3	25
Brandon Lingheath Trust	SHEPPERSON Benjamin	908	Homestead				1
BLISS Edward Esquire	Himself	910	Session Lings	Heath	9	1	22

Table 1 - Showing ownership, occupation, name, use and area of plots marked on the 1838 Tithe Plan that fall within the bounds of this study

APPENDIX 4

Norfolk County Council Archaeological Service Sites and Monuments Record

Parish WEETING WITH BROOMHILL,
NORFOLK

Ref	Site Name	Period	Summary Description
13571 – MNF 13571	Norfolk Railway	PMed	Opened 1844 to Norwich as the Norwich and Yarmouth Railway; Opened 1845 Norwich onwards as Norwich and Brandon Railway, the combined line became the Norfolk Railway, later the Eastern Counties and then part of the Great Eastern. Still in use.
31601 - MNF31601	Bromehill Warren Lodge	PMed	Possible site of Broomhill Warren Lodge, marked on 1791 map of Cadogan estate (Suffolk Record Office, Bury St. Edmunds, Ref. M550/3).
35352 - MNF39477		Rom	Roman Settlement February 2000. Field walking in forest. Probably NEO, BA/IA worked flints. RB, IA or PS, MED and Undatable pot sherds. MED/PM roofing tile. ?MED brick.
5618 - MNF5618			1920, 1928-9. Bromehill - top and western slope and between railway and river Little Ouse. Coarse RB sherds. <1>, NCM 10.939 from R. R. Clarke. Thetford Museum. R. R. Clarke..
32589 – MNF32589	Otteryngythe	Med	Site of Otteryngythe deserted village. Church recorded at village. No traces survive. RB, MED and PMED metal finds. IA and MED pot sherds.

APPENDIX 5

Suffolk County Council Archaeological Service Sites and Monuments Record

28/01/2005

Parish

SANTON DOWNHAM, FOREST HEATH,
SUFFOLK

Ref	Site Name	Period	Summary Description
STN 005	SF7459	Un	Possible round barrow mound, reported circa 1978 (S1)(S2).
STN 018	Taflin's Quarry SF7599	PMed	Following description of galleries 'with antler pick marks on them' (S1) in a working chalk pit the site was visited by J Plouviez.
STN 018	Taflin's Quarry SF7600	Un	Working chalk quarry where face workings revealing galleries "with antler pick marks on them' (possibly PMed iron flint mining pick marks?).
STN 021	SF10028	PMed	Area of "Old gun flint industries" defined on 6 inch record map by Rainbird Clarke (S1)(S2)(R1).
STN 024	SF10884	PMed	Straight ridge and furrow running at right angles to the Little Ouse river.
STN 030	SF12373	PMed	May 1991: Large area of chalk and worked flint exposed on cleared surface beside Forestry Commission ride/track.
STN 032	Stonepits Plantation; Marlpit Brin (1791) SF14020	PMed	Large area, full extent not yet determined, of mainly small pits and spoil (mainly chalk).
STN 038	SF14705	PMed	Flint mine complex.
STN 039	SF14706	PMed	Flint mine complex.
STN 047	SF16968	Un	July 1996: Mound visible in area of clearfelled woodland.
STN 049	SF16986	PMed	Long earthwork bank (shown on OS 1st ed map) with rectilinear enclosure (plantation) banks to SW (S1).
STN 050	SF16987	PMed	Series of banks in rectilinear layout.
STN 051	SF16988	PMed	Rectilinear block (defining plantation?) of earthwork banks (?) marked on OS maps of 1928 and later (earlier large scale maps not checked).
STN 052	SF16989	PMed	September 1996: Slight linear earthwork bank partially visible in area of cleared forestry plantation (S1).
STN 053	SF16990	Un	September 1996: Long low mound, circa 80m long by 20m wide defined on either side by visible ditches in area of cleared plantation.
STN 054	SF16991	PMed	Oval enclosure (bank?), defining earlier plantation, shown on OS maps of 1824 and later (earlier maps not checked).
STN 055	SF16992	PMed	Large oval plantation defined by mostly surviving outer banks (S1).
STN 056	SF16993	PMed	Oval enclosure, probably defining small plantation, shown on OS 1928 map (S1).
STN Misc	SF7478	Mes	Large flake found in June 1976 by Mrs E Makins.

APPENDIX 6

Suffolk County Council Archaeological Service Sites and Monuments Record

28/01/2005

Parish BRANDON, FOREST HEATH,

SUFFOLK

Ref	Site Name	Period	Summary Description
BRD 066	Lingheath Flint Mines SF9884	PMed	Ling Heath Flint Mines complex, first detailed by Skertchly in 1879 (S5).
BRD 091	Brandon Park; Brandon Park House SF14318	PMed	Park associated with Brandon Park House.
BRD 095	SF14541	PMed	Approximate boundary of area covered by flint workings (1934)- (on TL 78 NE & SE and TL 88 NW), delineated on maps by RR Clarke (S3).
BRD 114	Brandon Park SF15718	Un	Roughly circular mound about 1m high by 17m diameter in area of woodland between Brandon Park House & Lodge on B1106.
BRD 120	Brandon Park SF15724	PMed	Line of former road to Brandon Park House (see BRD 091) from A1065.
BRD 121	SF15725	Un	Trapezoid enclosure to N of and aligned with avenue/roadway BRD 120.
BRD 123	White Hill SF15727	Un	Very large round mound, raised berm and surrounding wide ditch.
BRD 125	Brandon Park SF15729	Un	Linear bank as defined in (S1).
BRD 126	Brandon Park SF15730	Un	Small artificial oval mound, circa 9m by 6m by 2m high with slight surrounding ditch.
BRD 127	Brandon Park SF15731	Un	Wide shallow gully, artificial? - not examined in detail but similar in form, through probably not plan, as ditch element of BRD 123.
BRD 128	Brandon Park SF15732	Un	Low linear bank circa 30cm high by 2m wide with right angled turn, adjoining London Lodge.
BRD 129	Brandon Park SF15733	Un	Straight linear bank just S of circular (plantation) bank (S1).
BRD 135	Mount Plantation; Forest Blocks 3094, 3095, 3956 & 3057 SF16963	PMed	Low bank, probably defining E boundary of Mount Plantation.
BRD 136	Mount Plantation; Forest Blocks 3094, 3095 & 3096 SF16964	PMed	Group of very well preserved hollows of flint mines and gullies adjoining, and to E of, B1106 Brandon to Bury road.
BRD 137	Forest Blocks 2006 & SF16965	PMed	Group of well preserved hollows of flint mine shafts of at least two forms to W of B1106 Brandon to Bury road.
BRD 150	Forestry Compartment 2003, Brandon Park SF18085	Preh	January 1998: Fieldwalking survey of Forestry Commission planting furrows, circa 40m apart transects, located relatively dense scatter of 44 Preh worked flints
BRD 151	Forestry Compartment 2001, Brandon Park SF18086	Preh	January 1998: Fieldwalking survey of Forestry Commission planting furrows, circa 40m apart transects, located relatively dense scatter of 68 Preh worked flints
BRD 154	Game Farm SF18646	Preh	March 1999: Preh, mainly Middle Bronze Age (R/C dated, though LBA style pottery), site discovered during evaluation & subsequent excavation.
BRD 165	Game Farm, 48 Woodcock Rise SF20364	Rom	Remains of at least two inhumations, one with skull between knees, found digging garden terraces in slope to south of house.

BRD Misc	Sandgalls, London Road SF15656	Preh	"On the southern slopes of the valley at Brandon, especially in the Sandgalls locality on London Road, the worked flints give evidence of a human settlement over
BRD Misc	Brandon Park; Forest Compartment 2033 SF17906	Un	Fieldwalking of tree planting furrows (40m apart traverses 20m long) by Paul Brooker located single flint `core' (possible PMed gunflint industry related).
BRD Misc	SF19921	Rom	Rom bronze coin found metal detecting July 2000.

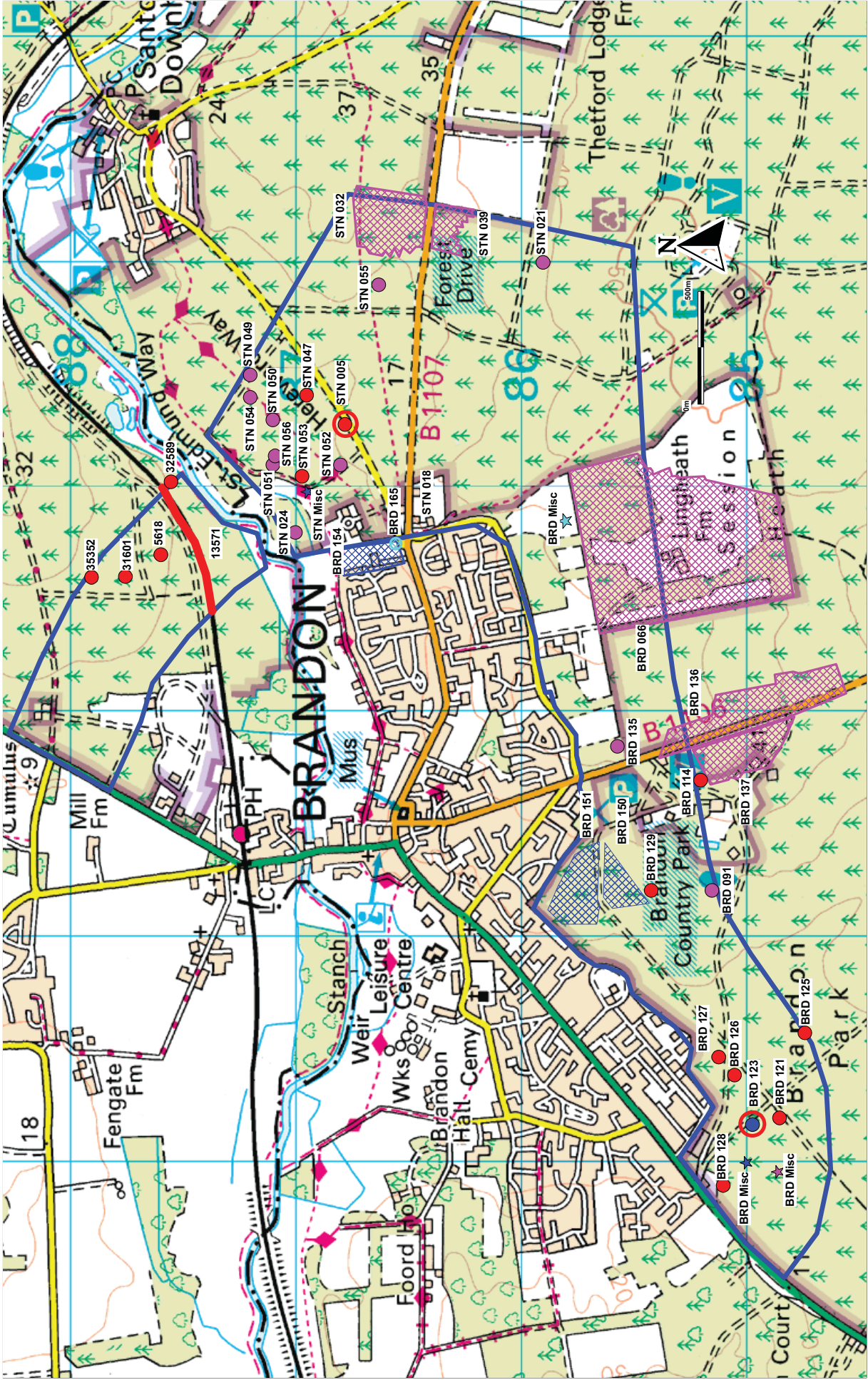


Figure 30 Map of SMR sites