THE INTERPRETATION OF FIELD WALKING FINDS FROM BINGHAM IN THE POST-MEDIEVAL TO MODERN PERIODS

by

PETER ALLEN AND GEOFF ASHTON

SUMMARY A field walking project was carried out by Bingham Heritage Trails Association between 2004 and 2010 in which finds from all ages, prehistoric to modern, were collected on all 868 hectares of arable land in the parish of Bingham. The primary objective was to use the information gathered to interpret the history of settlement within the parish. In this paper the post-medieval and modern finds distributions have been interpreted in order to test the validity of the basic assumption used for earlier periods that high-density clusters of sherds are found close to habitations. An attempt is made to use finds distribution data to shed some light on changes in land use, the ways in which domestic waste was disposed and whether or not night soil was used as fertilizer in Bingham.

INTRODUCTION

Bingham, a market town in south Nottinghamshire, is situated at the centre of the 1215 hectares parish and in 2013 had a population of just over 9,000 (Figure 1). Between 2004 and the spring of 2008 Bingham Heritage Trails Association (BHTA) field walked all 868 hectares of arable land in the parish. The project, carried out with a grant from the Local Heritage Initiative (now the Heritage Lottery Fund), was to research the history of settlement in the parish. The full project results have been published by Allen, Ashton and Henstock (2010). Allen (2011) covered the field walking, while full details can be found on the BHTA website at http://www.binghamheritage.org.uk/history_of_settlement/

While field walking is well established in archaeology there is little in the literature about its use for the post-medieval and modern periods, yet field-walked finds for these periods can reveal much about the history that is not covered in documentary sources. The BHTA field-walking programme aimed to cover 10% of each field by walking 2-metre wide transects 20 metres apart. The protocol followed is given in full detail on the BHTA website.

The earliest available map for Bingham was constructed during the project from a written manorial survey done in 1586 of over 80% of the parish owned by the manorial lord. A later detailed map, also covering the part of the parish owned by the manorial lord, was made during the project from original documentation for a manorial survey done in 1776. The tithe map is dated 1840–41. The first six-inch Ordnance Survey map for Bingham is dated 1883. Thus, maps exist from 1586 to the present that show the distribution of housing in the parish and these can be compared with maps showing the density of field-walked finds. These maps were also referenced to the hedgerow survey carried out in 2003 and reported on the BHTA website.

The basic assumption that clusters of finds indicate the proximity of habitations is examined and information is gathered from the field-walked data about land use, the disposal of domestic waste and the use of night soil.

GEOLOGY AND TOPOGRAPHY

The whole of the parish of Bingham is underlain by mudstone and sandstone of Triassic age (BGS 1996). Superficial deposits are mainly lake clays possibly dated from a post-Devensian lake covering much of the area north of the railway line. There are small areas of alluvium and colluvium, but no significant spreads of glacial till. Bingham town

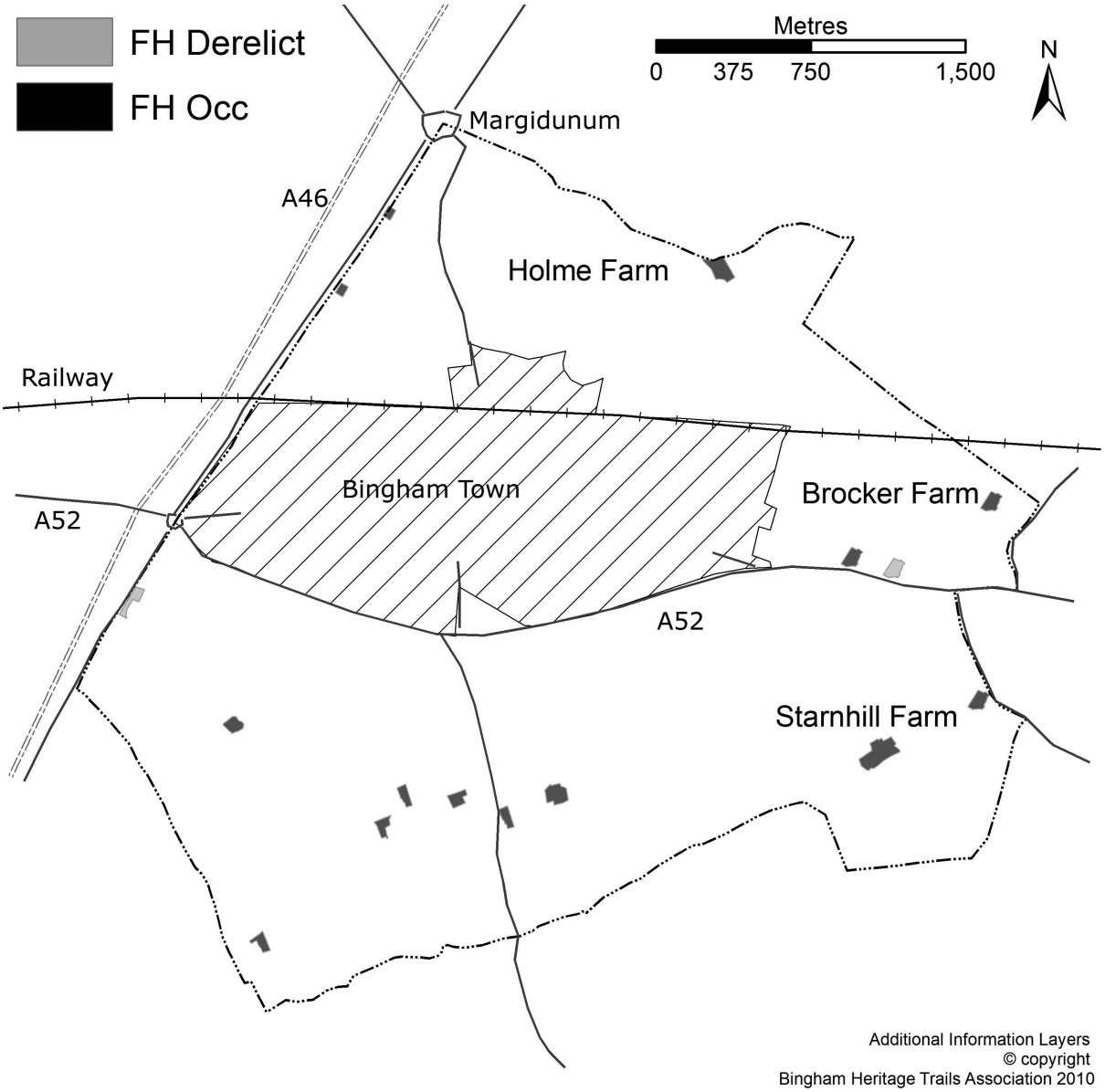

FIGURE 1: Bingham parish showing the location of derelict habitation sites (FH Derelict) and currently occupied farms and cottages (FH Occ). Built-up Bingham is the diagonal striped area.

is built on an outcrop of the Hollygate Member of the Edwalton Formation. It consists of interbedded water-bearing sandstone and mudstone. Along the south of the town there is an east-west orientated ridge with a sharp escarpment on the north and a long dip slope to the south. The high point on this ridge is 55 metres OD. The Roman road, the Fosse Way forms part of the western parish boundary, while the parish is bisected by the east-west A52.

THE MAPS

1586 map

From around 1460–80 the Bingham manor was owned by the Stapleton family who sold it in 1590 to Sir Thomas Stanhope. Four years prior to the sale (1586) the lord of the manor, Brian Stapleton commissioned a survey of his estate. It was carried out by Robert Johnson of London, a professional surveyor, and then written up in Latin into a parchment book (N(ottinghamshire) A(rchive) 1). If there was ever a map with it, it has been lost. In essence the survey gave details of the

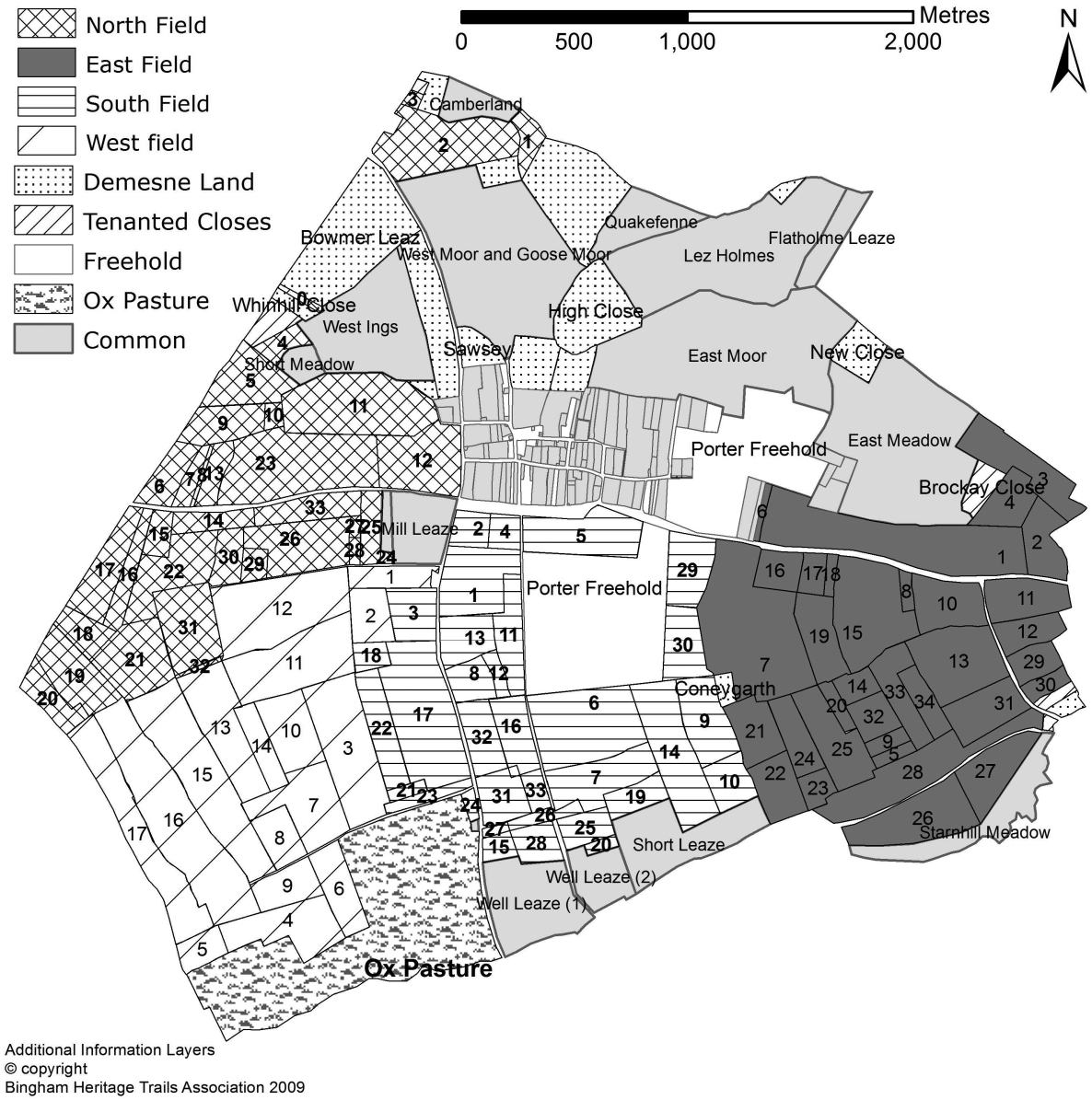

FIGURE 2: Conjectural map for 1586 showing the arable open fields, demesne land and common land. North Field is separated into two parts by demesne land and common. Individual furlongs are numbered.

size, owner, tenant, and immediate neighbours for each parcel of land, including the strips in the open fields. Details of how the 1586 map was constructed from this information are given in Allen, Ashton and Henstock (2010, p.51). A summary of the methodology is given here.

To construct the map pen pictures of the tenanted holdings were reproduced digitally and fitted together using a Geographic Information System (GIS), ArcMap 9. The compilation was then compared with the tithe map of 1841 and other maps to test validity. The end product is a conjectural map of the parish for 1586 (Figure 2). While it is unlikely to be wholly accurate with regard to the exact disposition of the constituent furlongs the eventual map represents exactly the area of each furlong given in the documentation. The relative positioning of the strips within them is accurate overall. The map shows four open fields, areas of moor and other common pasture, the location of demesne land and freeholdings, the roads and street layout for Bingham and locations of each messuage in the town. The location of buildings in each messuage was not described in the original document; the conjectural map shows the inferred sites. About 400 acres (c160 hectares) were farmed directly by the Lord of the Manor, while one significant freeholder, the Porter family, owned 100 to 120 acres. There were several other smaller freeholders; thus, the 1586 map contains some blank areas that came under their ownership within the town, but in the open fields their strips are recorded accurately.

The street layout of Bingham conforms to the grid pattern of the planned medieval villages (Stroud 2002, p.23–24) (Figure 3). The main east-west street is Husband Street (now Long Acre and Long Acre East). Parallel back streets are Chappell Gate, Old Market Place, Church Gate and Goodwyn Lane to the north (now Newgate Street, Market Place, Church Street and East Street) and a lane referred to as Nottingham Gate, now The Banks, to the south. There were at least four cross lanes linking them. Nearly all the tenant farmers lived on Husband Street, while the cottagers lived along the northern back street. There were few properties along the cross lanes and none on the south back street, which was mainly used for access to the three open arable fields that lay to the south of it.

Information about the freeholders at this time is sparse, but there is no indication that any lived outside the town except for the Porter family, whose house is thought to be in what is now Crow Close, a field at the eastern end of Bingham (Henstock and Allen 2012). There are no indications that any tenants lived outside the town.

1776 map

As with the 1586 map this one was compiled from data solely about the estate of the main landowner, in this case the Earl of Chesterfield. It dates from about 100 years after general enclosure (Allen, Ashton and Henstock 2010, p.81). The survey documentation consists of a set of drawings showing sketch maps of the closes or groups of closes under a common tenancy (NA 2). These were fitted together with reference to the 1841 tithe map (NA 3) to make a map of the whole parish, though again with gaps for land owned by freeholders. Information about the tenants in the town enabled a map of the whole of the parish to be drawn showing habitations. Unlike in 1586 where everyone lived in the town, by 1776 three farms had been built outside town at the centre of large consolidated holdings. These were Holme, Brocker and Starnhill farms, all of which still exist today (Figure 1).

Modern maps

The tendency to consolidate rented fields into large, contiguous holdings continued from the 18th century until it was completed in the 1960s. In all there are 16 sites that have been or are currently inhabited outside the Bingham town area. Of these Fosse Farm, situated on the Fosse Way, is now derelict. A cottage on the north side of the A52 near the petrol station, was occupied from at least 1841 until 1922 and is now completely demolished. The other farms and cottages situated in the fields around are still occupied, though some of the farms no longer function as such. (Figure 1).

FIGURE 3: Street plan for Bingham taken from the conjectural map for 1586.

FINDS IDENTIFICATION

The identification of post-medieval and modern finds was done by several specialists.

Elaine Parker identified the bones and teeth while Peter Hammond identified the clay pipes and glass. Adrian Henstock took responsibility for the salt-glaze stoneware.

Ann Quinn identified the modern pottery collected in the first year. The post-medieval pottery, particularly the coarse earthenware, posed a problem because there was no standard regional

type series covering all of it. Reference was made to *Pottery in Britain* by Lloyd Laing (2003) while Alan MacCormick, Chris Cumberpatch, Vicky Nailor, Jane Young and Jon Goodwin were all consulted. The reference collection of sherds held in the Brewhouse Yard Museum, Nottingham lumps together some of the varieties of coarse earthenware recognised in Bingham that are thought to be significantly different. Specimens found in Bingham were compared with those found in Ticknall where much of it was probably made (see Spavold and Brown 2005), but there was no published type series for Ticknall at that time. Recent research there may fill this gap. The classification system eventually used for coarse earthenware in this study is the responsibility of the lead author (PMA).

LAND USE

Bingham lies at the heart of the "champion" lands, the part of England where open field farming was practiced. The conjectural map for 1586 gives an illustration of the land management plan for the parish at that time (Figure 2). The distribution of field-walked finds overlain on this, and later, maps shows how land use has subsequently changed.

Land use in 15th and 16th centuries

Allen, Ashton and Henstock 2010 and Allen 2011 show that field walked finds derived from manure scatters for the medieval ware types up to and including late 14th to 15th C Light-bodied Gritty Ware are present in areas that in 1586 were designated as pasture (Figure 4). They conclude that the land management plan indicated by the 1586 map probably originated in the late 15th century when the Stapleton family acquired the parish. The key to this interpretation is the distribution of Cistercian Ware (Figure 4). Spavold and Brown (2005, p.13) suggest it was being made in Ticknall, south Derbyshire, in the early 16th C, but later work by Boyle and Rowlandson (2008) on a late 15th C kiln there suggests an earlier date. It is presumed to have been available in Bingham from that time. Finds of Cistercian Ware are absent in Ox Pasture in the south western part of the parish and some other places used for pasture in 1586, while earlier material, such as Light-bodied Gritty Ware,

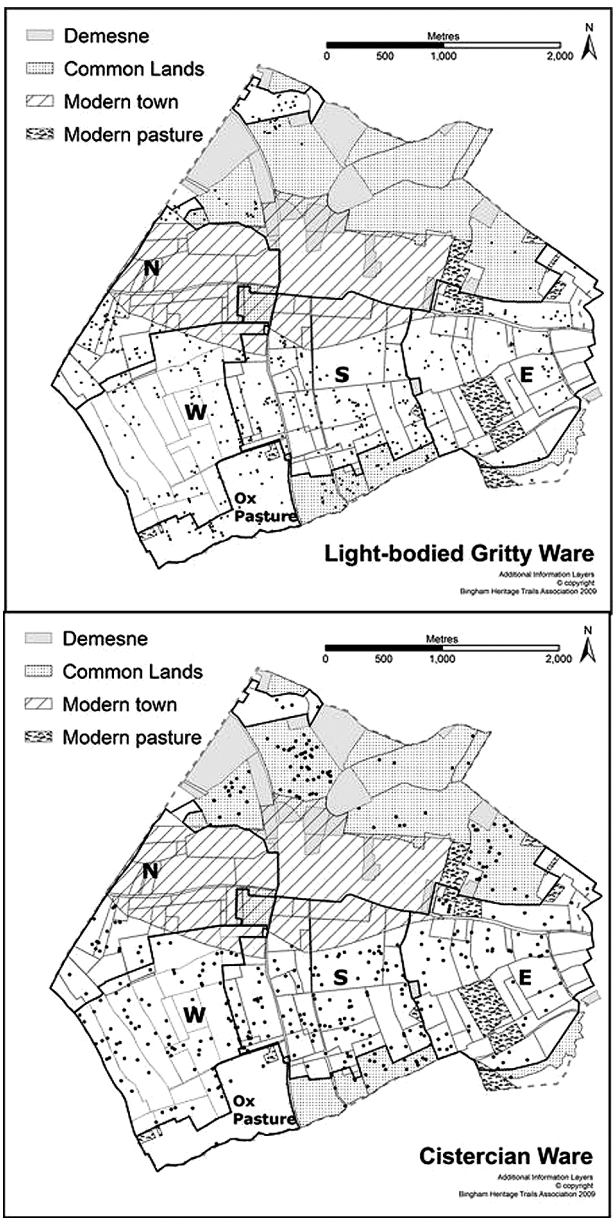

FIGURE 4: Distribution of Light-bodied Gritty Ware (top) and Cistercian Ware (bottom) finds overlain on the 1586 map. The symbols N, W, S and E refer to the arable North Field, West Field, South Field and East Field respectively. The modern parish boundary (dashed line) differs in places from the contemporary boundary.

occurs in these areas. The highest concentration of Cistercian Ware is in a locality in the north of the parish that the map shows has no habitations nearby and for which another explanation is explored in this paper.

Land use in the 17th century

The parish changed hands in 1590, when Sir Thomas Stanhope, whose grandson and descendants later became the Earls of Chesterfield, acquired

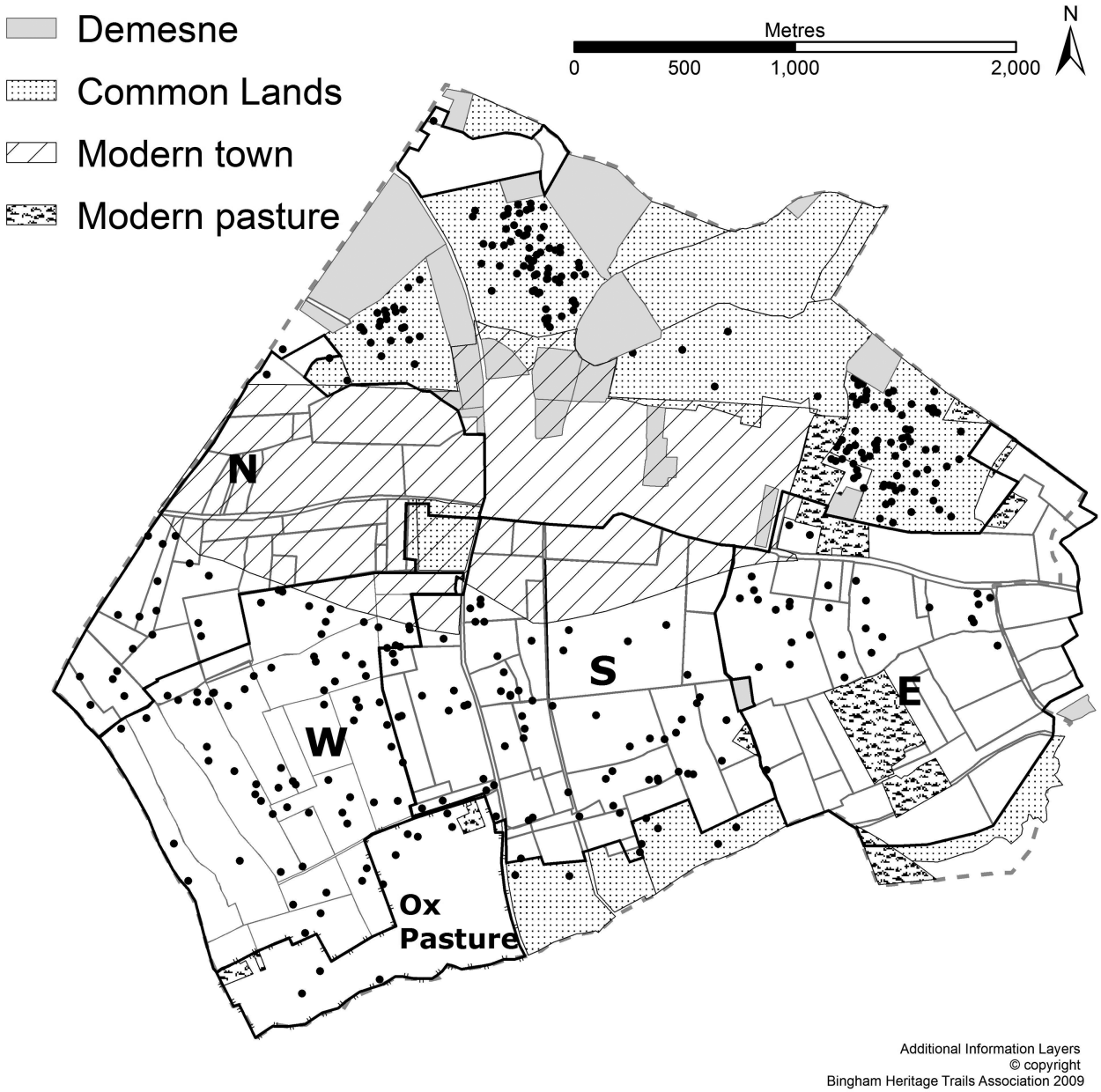

FIGURE 5: Distribution of Midland Yellow Ware finds overlain on the 1586 map. The symbols N, W, S and E refer to the arable North Field, West Field, South Field and East Field respectively. The modern parish boundary (dashed line) differs in places from the contemporary boundary.

it from Brian Stapleton. The map showing the distribution of Midland Yellow Ware (late 16th to 17th C) (Figure 5) differs from the Cistercian Ware map in that the southern half of the open, arable East Field and the north-eastern part of East Field around Brocker Farm are free of sherds as are all or parts of several furlongs in West and South fields. There is no documented explanation for a change of use that may explain this, but it is likely that Sir Thomas, with agreement from the strip holders, converted some arable land in open fields into grazing, possibly for sheep. The stimulus for this might have been purely economic, but the loss of labour during the outbreak of plague in Nottinghamshire in 1592–3 may also be a factor.

Land use in the 18th century

General enclosure probably happened in c1680-90 (see Allen, Ashton and Henstock, 2010, p.71–72). By 1776, the date of the next manorial survey, the whole parish was divided up into small closes. The distribution of the Nottingham-type Brown Stoneware sherds dated to c1690-1780 shows some areas completely free of pottery (Figure 6). These include most of the land to the south of Holme Farm that was medieval common grazing (Lez Holmes, East Moor and East Meadow in Figure 2). In addition there are several closes free of these sherds in the southern half of the parish, particularly around Starnhill Farm. When compared with the distribution of Yellow Ware (Figure 5) it seems that much of this land had been pasture since early post-medieval times and continued as such after enclosure at the end of the 17th century. There are references in the newspapers of the period to support this land use. In the announcements of marriage there are several references to "graziers" of Bingham for the period 1768 to mid 19th century, though it is not always possible to identify their holdings. In one, however, the Creswell & Burbage Journal of 6th December 1777 (held in Nottingham Central Library, Angel Row), there is a reference: "*On Monday last was married at Bingham Mr. John Marriott to Miss Sarah Hutchinson, daughter to the late Mr William Hutchinson, a wealthy grazier of that place*." Mr Hutchinson was the tenant at Starnhill Farm, which included the southern part of what was East Field, an area free of Yellow Ware and Nottingham salt-glaze stoneware sherds. Interestingly, though three farmhouses are shown situated in the fields away from Bingham in 1776 there are no signs that the Nottingham stoneware formed clusters associated with two of them. Clusters do occur about 400 metres from Brocker Farm, the third (Figure 6). The dense cluster in the north of the parish due west of Holme Farm coincides with dense clusters of Cistercian Ware and Yellow Ware (Figures 4 and 5) and is examined later in this paper.

Land use in the 19th century

The tithe map of 1841 shows that much of the area around Starnhill Farm that was pasture on earlier maps had been converted to arable, but in the Land Utilisation Survey of 1935 (Figure 7) (see Allen, Ashton and Henstock, 2010, p.103) between a third and a half of it was pasture. Even the land on the alluvial flat along the River Smite forming an arc on the southern border of the arable East field was only partly retained as pasture in 1841. The widespread distribution of shells, glass, earthenware, porcelain and stoneware, all likely to have been deposited as manure scatters in the 19th and 20th centuries, suggests that land use alternated between arable and pasture throughout this time when mixed farming predominated and cropping was rotated both within fields and among them. The areas of pasture were only completely ploughed up when the horse was replaced by the tractor and the era of mixed farming came to an end in the 1960s. Bingham farms were then converted entirely to arable.

Demesne Land

In the 1586 manorial survey closes designated as demesne land are all in the northern half of the parish (Figure 2), though the lord of the manor worked strips almost always in contiguous blocks in all the open fields.

All of the closes, (Bowmer Leaz, High Close, New Close, a close to the northwest of Quakefenne and one unnamed to the south of Bowmer Leaz

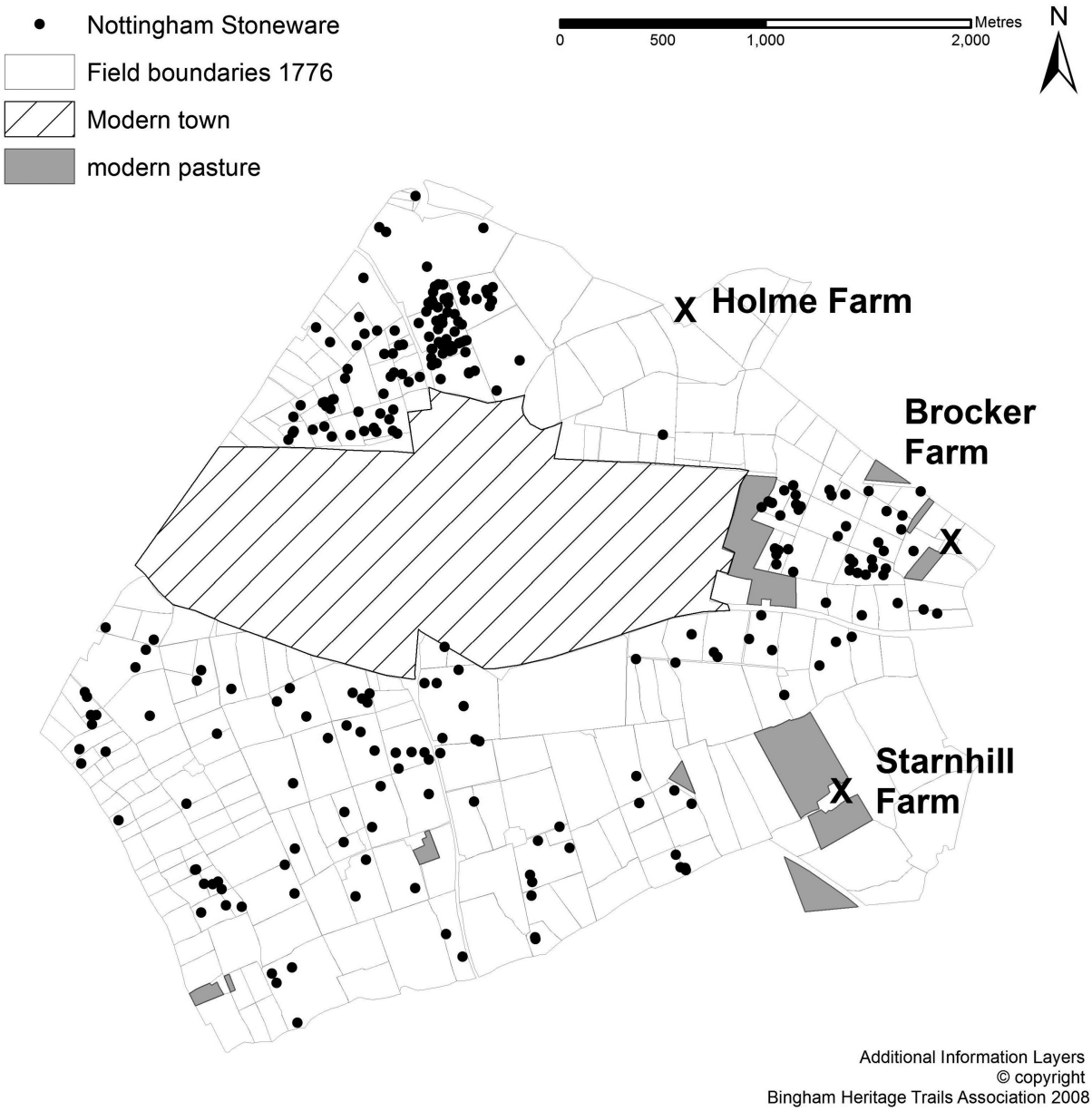

FIGURE 6: Distribution of 18th century stoneware finds showing the three farms that were built away from Bingham among consolidated holdings late in the 18th century. The field boundaries are those of 1776.

in Figure 2) are completely free of Light-bodied Gritty Ware, Cistercian Ware (Figure 4) and Yellow Ware sherds (Figure 5). The distribution maps show some sharp boundaries with surrounding closes. One implication of this is that the demesne land was enclosed, probably since the 14th C. This may indicate a possible non-arable use for these closes, though Jones (2004) has suggested that arable demesne land was preferentially manured by enclosing stock on it with the result that there would be little pottery from manure scatters on it. The few surviving hedges around them are species diverse and could date from the 16th C or older, which would imply they were needed for confining stock

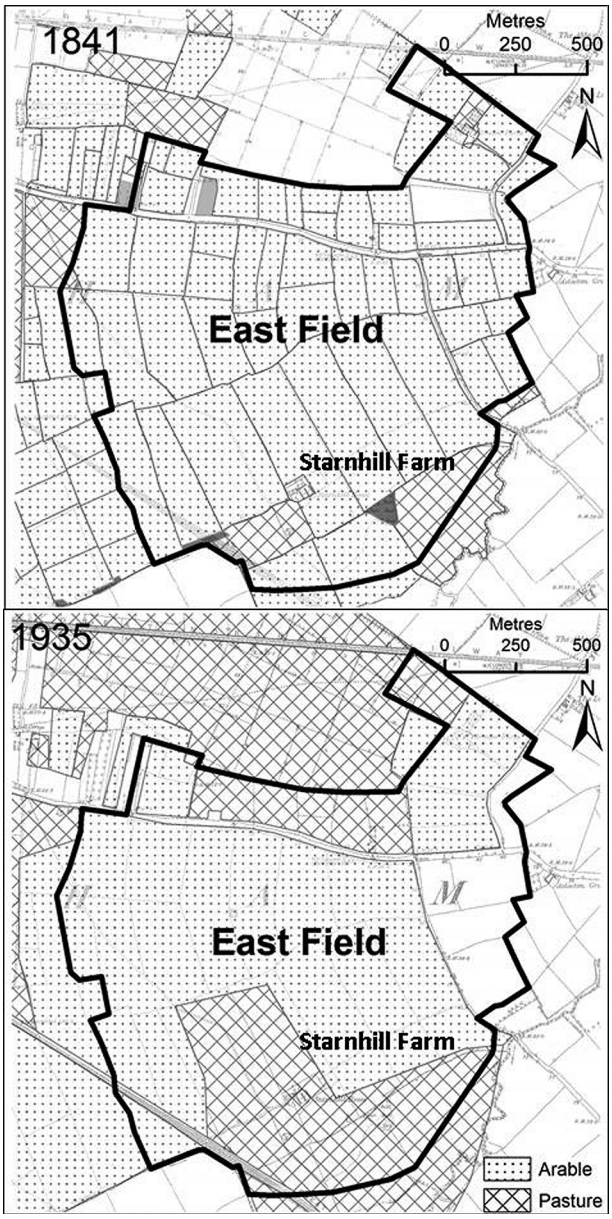

FIGURE 7:Land use in the area of East Field on the tithe map (top) and from the Land Utilisation Survey of 1935 (bottom). The same key applies to both maps. Topographical information is from the 1883 O.S. map.

to the closes. High Close, New Close and the close northwest of Quakefenne, (Figure 2) remained free of sherds throughout the 18th century (Figure 6), though one or two finds near the field boundary may be where the scatter in adjacent fields may have been redistributed due to 20th century ploughing or a result of inaccurate locating. The other demesne closes do contain 18th C scatters and might indicate a change in use from stock rearing to arable.

DISPOSAL OF RUBBISH

In Bingham there is practically no documentary information about the disposal of domestic rubbish and night soil (domestic sewerage) for any period prior to the institution of regular collections by the local authority in the 20th century. According to Herbert (2007), prior to the mid nineteenth century most solid domestic waste disposed in towns was collected, sorted and recycled. In rural areas, however, there is no reference to communal collecting services and recycling. An examination of the distribution of clusters of field-walked finds for all periods after the date of the first map (1586) shows little or no correlation between the high concentrations and the known places of habitation outside the town itself. Disposal of domestic rubbish must have been done in some way other than in pits close to the house.

Village dump

A striking feature of the distribution of Cistercian Ware, (Figure 4) and Midland Yellow Ware (Figure 5) is the relatively high density of finds due west of Holme Farm in the north of the parish. These fields lie to the east of Chapel Lane in what was called West Moor and Goose Moor in 1586 (see Figure 2) and which are not near any known habitation site. By contrast there are almost no finds at this site shown on the Light-bodied Gritty Ware distribution map (Figure 4). In 1776 the ground was shared grazing and divided into four closes, two each on Far Little Moor and Meadow Moor**.** These lay to the west and east respectively of a track (West Moor Lane), which is an extension of Moor Lane, leading from Bingham Market Place to Margidunum (Figure 8).

These high concentrations remain here into the 19th Century. To give an example to illustrate the difference between these fields and the rest in the

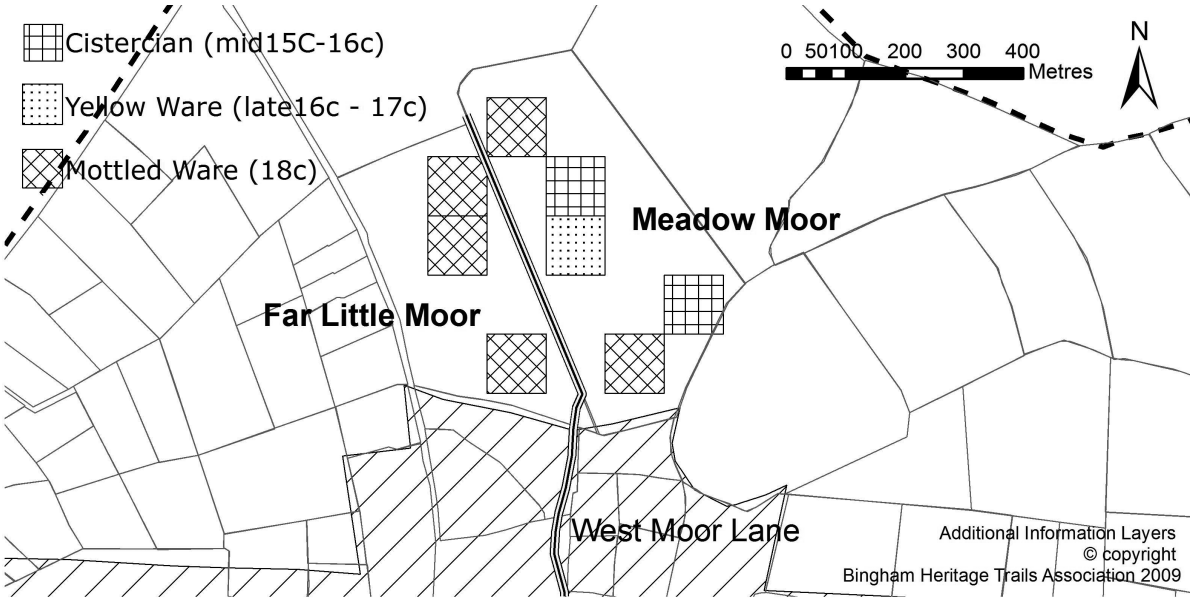

FIGURE 8: The area of the village dump showing the locations of the highest concentration of Cistercian Ware (5–7 finds per hectare), Midland Yellow Ware (7–11 finds per hectare) and Mottled Ware (21–26 finds per hectare). Each square is 100 m. They are taken from 100m-grid distribution maps. Field boundaries are from the 1776 map.

parish the average density on the 1776 map of early 18th C Mottled Ware in the whole parish except Far Little Moor and Meadow Moor, is 1.5 finds per hectare. In Far Little Moor and Meadow Moor there are peaks of 21–26 finds per hectare. The concentration of Nottingham salt-glaze stoneware (Figure 6) here is also high and remains so for ware types through to 19th C coarse earthenware.

Concentrations of glass, clay pipes, oyster shells and bones are similarly relatively high here. Many of the bones show signs of butchery. Some have been split to release the marrow. There are sheep's teeth and fragments of their jawbones suggesting that they are the remains of cooked sheeps' heads. Other bones include cow shin and pigs' toe are possibly the remains of other cheap cuts of meat. Indeed, much of the bone debris suggests it was kitchen waste, though there are some items such as fragments of cow horn and cows' foot that may be slaughterhouse waste. The presence of small pieces of human bone among them is more difficult to explain.

The best explanation for this collection of finds and their high concentrations is that this is the site of the village dump where the contents of the ash-pit privy and solid rubbish were brought and that it had been in use since the deposition of Cistercian Ware in the late 15th century.

Ploughing in the 20th century has redistributed the sherds but the location of the high points for Cistercian Ware, Midland Yellow Ware and Mottled Ware remain visible (Figure 8). For the Tudor-Stuart period high finds concentrations occur only in Meadow Moor on the eastern side of the track where the 100m grid plots show two high spots of 5–7 finds per hectare for the Cistercian Ware and at a different locality one of 7–11 finds per hectare for the later Midland Yellow Ware. High values for Mottled Ware (21–26 finds per hectare), 18th century stoneware and 'Staffordshire' Slipware are found on both sides of the track, which suggests that the western fields came into use for dumping at the end of the 17th century.

The clay pipes in these fields are particularly informative. There are no definitively 17th century dated bowls in Far Little Moor (west side of the track). The earliest dated pipe here has a range 1680–1720. However, there are 44 dated bowls

with a range through the 18th century and 18 that give 19th century dates prior to 1880. This confirms the suggestion from the pottery that dumping to the west of the track did not start before 1680, the possible date of general enclosure, and was probably finished by 1880.

On the east of the track in Meadow Moor, by contrast, there are 34 bowls with dates that range through the 17th century and 45 with dates that span the 18th century. There are only five that were definitely made after 1800.

Using the clay pipe data in conjunction with the pottery it seems that dumping took place first east of the track during the time that Cistercian Ware was used in Bingham, which is probably late 15th to early in the 16th century, and continued there until the end of the 18th century. On the west of the track, dumping began no earlier than 1680 and continued until the late19th century.

The continued use of these fields for the village dump after general enclosure is partly explained by the retention of them for common grazing at least to 1776. Interestingly the late 17th C possible date for the start of the use of ground west of the track for dumping coincides with the postulated date of enclosure and may reflect on an agreement reached between the new tenant for these fields and the landowner on enclosure. Dumping to the east of the track appears to have stopped at about the time of the 1776 survey. At some time between 1776 and 1841 all four of these fields came under a common tenancy. The dateable assemblages of finds suggest that only in one small part of the western side of the track did material continue to be deposited until around 1870–90 (see later).

While this site is most clearly one of a possible village dump there are other anomalously high concentrations of finds in East Meadow and West Ings (Figure 2) both of which may have been used for a similar purpose, serving residents from different parts of Bingham at different times.

NIGHT SOIL

The disposal of sewerage is hardly ever documented. Until the early nineteenth century this would not have been a severe problem in Bingham. There is anecdotal evidence repeated by Bell (1998, p.28) that the contents of night-soil buckets, probably introduced in the mid 19th century, were disposed of in the gardens and orchards of homes in Nottinghamshire villages into the 20th century. Many homes in Bingham were built among gardens and orchards where disposal in pits could be arranged. However, in the period from 1776 to the mid nineteenth century the population of Bingham doubled and much of the new housing built to accommodate the increase was in tenements of terraced housing with no garden at the front and only a yard at the back. Sewerage was in places discharged into an open sewer down the middle of the street at the front of the houses.

By the middle of the nineteenth century public pressure on Government to deal with a problem that was not only creating an unpleasant living environment in the towns, but was being increasingly understood as a health risk, led to a series of Acts of Parliament to regulate the disposal of sewerage and domestic refuse. Chief among these are:

- 1847 **Town Improvement Clauses Act** legalised the discharge of sewerage into rivers and seas and allowed its sale for agricultural purposes.
- 1848 **Public Health Act** decreed every new house should have a water closet or ash-pit privy, which was to be emptied by a night soil collector.
- 1865 **Sewerage Utilisation Act** created sewer authorities and gave town councils and other health authorities the power to dispose of the sewerage for agricultural purposes.
- 1868 **Sanitary Act** enlarged the powers of the sewer authorities in relation to house drainage, privies and the removal of house refuse.
- 1872 **Public Health Act** required the appointment of a medical officer in each area, to be responsible for sanitation. The Poor Law

Guardians for Bingham District became the Sanitary Authority in September 1872 (NA5).

Perhaps the most significant are the Act of 1847, which allowed the sale of sewerage to farmers, and the Act of 1865, which gave local authorities the power to sell it. Night soil is a rich source of phosphate, but there is very little documentary evidence of it having been used in English farming. Macfarlane (2002) quotes several sources on farming in England from the 16th century onwards which make no mention of using night soil among their lists of fertilizers. He notes that in some early 19th century books the authors lament that this rich source of phosphate is being wasted though phosphate was being provided from guano, imported from Chile after 1840. Even the 1847 Act had little immediate impact on the use of night soil in farming because it legitimised the disposal of sewerage into rivers and the sea. For many towns this gave them licence to tip directly into the waterways. At some time in the second half of the nineteenth century, possibly after the 1865 Act, night soil came to be used as a fertilizer in England and continued into the 20th century, only ending when most households had become equipped with a water closet.

Records on how night soil was used in Nottinghamshire are scarce. In his account of farming in Nottinghamshire, Lowe (1798, p.103, p.111) states that night soil was not a favoured fertilizer in the Vale of Belvoir, but elsewhere in the county he describes how compost heaps were built using night soil and "earth" to create a medium for soil improvement. Whether or not this procedure was followed by farmers in Bingham in the 19th century is not known.

Distribution

Records for the City of Nottingham (see Hammond 1985 and 1995) show that from 1865 the city night soil was collected in tubs, taken to the East Croft depot on London Road and loaded onto council-owned barges on the Nottingham to Grantham canal, which then transported it to a council wharf at Gamston Bridge to be sold to farmers for fertilizer. The farmers objected to there being too much extraneous material (broken pots and glass etc) and the barge *trimmers* were required to pick through the material to remove it. Night soil was also transported in council-owned rail wagons and used on fields adjacent to the railway.

There are records of Nottingham night soil being delivered via the canal to Redmile. (See Redmile Village Design statement on LCC web site) and the Bingham Sanitary Authority minutes (NA 5) record a nuisance caused by manure on the wharf by the road, the A46, in Cropwell Bishop, which might suggest that night soil derived from Nottingham was being delivered to Bingham. However, Henstock (1986, p.17) shows that in the middle decades of the 19th century the population of Bingham was close to 2000, which was probably large enough not to require a supply of night soil to be made into fertilizer from outside the town.

How Bingham dealt with night soil

The clay pipe data from the sites of the 18th and 19th century dumps on either side of Moor Lane on Holme Farm give an indication that dumping village waste here had ended by 1870–80. As a result of the 1872 Act the Sanitary Authority for Bingham (NA5) became the main regulatory body for sanitation. The committee met for the first time in September 1872 and appointed a salaried Medical Officer of Health and an Inspector of Nuisance. The authority was responsible for dealing with "nuisances", the maintenance of the sewers, ensuring the provision of clean drinking water and dealing with outbreaks of disease. During the period 1872–1881 outbreaks of typhoid fever were common, while scarlet fever, whooping cough and diphtheria were also recorded. The Wesleyan School logbook for October 1874 also records that there was an outbreak of scarlet fever in the town (NA 6). While there are several records of payment of unspecified special expenses there is no record in the minutes of the Sanitary Authority of any regular payment for emptying ash pits, buckets or privies nor any receipts for the sale of material (NA 5). The responsibility and cost of dealing with night soil and solid waste seemed to have fallen on the householder and was not covered

by any of the rates then levied. Most streets in Bingham had a sewer, sometimes open. They were frequently reported to be blocked and one can see the temptation to throw all kinds of waste into these rather than pay to have it taken away.

Night soil assemblage

Bell (1998, p.7–16) quoting various sources says that the ash-pit privy was widely used before the introduction of the bucket and that it was used for the disposal of much domestic rubbish including clay pipes and broken crockery. The ash-pit privies were cleaned out once or twice a year and it could well have been that the contents were carried to a communal dump, but when buckets were introduced generally in the mid 19th C in place of the ash-pits they were emptied and collected every week. Bell gives accounts from residents of Nottinghamshire villages, where emptying the bucket was the responsibility of the householder, who usually buried its contents in a hole in the garden once a week. Farmers tipped the buckets onto the farmyard midden. There was no mention of how solid domestic waste was disposed of in the villages, but the temptation to dispose of it in the night soil bucket must have been irresistible. Thus, in addition to broken crockery (including earthenware and stoneware) and clay pipes it is likely that there was kitchen waste containing oyster shells and bones, broken glass and toys. Fireplace ash, cinder and clinker are likely to have been tipped in the garden if there was one. All these were collected during field walking. From them, five were chosen for detailed analysis. These are clay pipes, oyster shells, glass, stoneware and china/earthenware. The origin and dates of bones and teeth collected were felt to be too uncertain to be included, particularly near Margidunum where a high concentration of bones is likely to be Roman in origin, and in the fields around the village dumps where they are likely to range in age from 15th century onwards. Oysters, though eaten in England at all times since the Roman period, were hugely important as a foodstuff for the poor in the 19th century and it is likely that the wide spread of oyster shells in the fields of Bingham is largely due to disposal at this time. Oyster shells, therefore, have been included. Cinders and coal, though a reliable component of ash-pit privies, may not have been put into the night-soil buckets and could also have been produced by steam-powered farm machinery used in the fields. The miscellaneous items including broken toys and glass marbles were too few for valid statistical analysis.

Methodology of analysis of the data

The density of finds in terms of finds per hectare was calculated for each field shown on the 1883 O.S. map for each of five categories – post 1750 clay pipes, oyster shells, 19th/20th century glass, stoneware and china/earthenware. The range in density values within each of the five chosen categories was statistically examined using a proprietary algorithm developed by ESRI for use as the default method in ArcMap GIS. It is based on the Fisher-Jenks algorithm and is referred to by ESRI as the 'Jenks natural breaks' method. They claim that it is more robust than Fisher-Jenks procedure and better able to deal with a large number of classes from small numbers, for example six classes where 70% of the values equals 4. For a full discussion of the method see http://mappingcenter.esri.com. In this study five groups were created in all datasets.

Various methods of comparing night soil densities between fields were considered. The Jenks method produced five groups defined as ranges of finds per hectare per field. Adding these values up for each of the five categories for each field would give undue prominence to the largest assemblage (china/earthenware) at the expense of identifying the provenance of the mix. The method chosen was to rank the Jenks groups 1 to 5 (5 being the highest) for each component and add up the ranks for each field to give the overall *Night Soil Ranking* for each individual field. Thus a field in which all five components carried a rank of five would have a score of 25 (NOTE that this is the sum of the ranks, not the actual densities). The overall scores were also subjected to analysis by the Jenks method to give five groups. These are shown in Figure 9 in which the fourth highest group consists of fields with *Night Soil Rankings* of between 12 and 16.

Discussion of night soil

In 14 fields, all with closely dateable glass and clay pipes, the *Night Soil Rankings* were between 17 and 22. This range constituted the highest of the five groups identified by the Jenks method and close analysis was confined to it. No field achieved the theoretical maximum score of 25; two reached 22. The distribution of these fields in the parish is shown in Figure 9.

Among these 14 fields:

- The southern part of a field cut off by the A52 by-pass (A in Figure 9, 9392F in the BHTA database) was designated as garden strips in the early 19th C and was used for allotments well into the 20th C. With a score of 21 it had only two pieces of glass in it, suggesting that there had been careful hand sorting before the night soil was spread. This field had the highest content of clay pipe fragments, which probably tells us something about gardeners.
- Three fields with scores of 19 and 20 (Fields B, C and D in Figure 9; 0208A, 0208B and 0306A in the database) were situated in Far Little Moor and had been used as the village dump. It is in these fields that there is evidence to suggest that dumping took place from c1680 to late in the 19th century. The fields in Meadow Moor, to the east of the track, were in use earlier and have slightly lower values.
- All of the remaining 10 fields were alongside a track or road shown on the contemporary 19th C maps suggesting that ease of transport was a key factor in determining where to dump night soil.
- In 1841 four of the 14 fields were rented by smallholders with less than 15 acres, including three who lived outside the parish in Cropwell Butler. The remaining fields were rented by farmers with holdings of 25 acres or more.
- While all of these tenants may have been dumping their domestic night soil in the fields, all of which were well away from their homes, the larger tenants may have been using their fields to store night soil for use and subsequent dispersal as a fertilizer (see later).
- Where dating evidence is precise the majority of the closely dated items fall in the second half of the 19th century or later, with a low density scatter for the earlier material. One possible explanation is that most villagers dumped the content of their ash-pit privies and cesspits on the village dumps up to around 1870 or 1880, the date of the most recent clay pipes found in these fields. The field scatter of material dated before this time probably got there in farmyard manure. After around 1870 when the village dump ceased to be accessible to them it became necessary for householders to find other ways of disposing their waste, probably by taking it to fields far away from their homes.
- The main conclusion from this analysis is that the fields with the highest concentrations of the derivatives of night soil were the village dump, allotments and small fields close to a road and far from the tenant's home Here tenants deposited their own night soil and solid rubbish from the second half of the 19th C.

Night soil as fertilizer

The five elements of night soil assemblage used in this analysis are widespread in the parish. The question arises whether any of this material was deposited in the fields as night soil processed as fertilizer for agricultural use.

An examination of the farms of tenants with more than 50 acres at the time of the tithe map (1841) shows two clear patterns (Figure 9): those with low overall rankings and those with moderate to high rankings.

This pattern can be illustrated by reference to four blocks of land (1 to 4 in Figure 9). Although the details here relate to information gathered from the tithe apportionment of 1840–41, the boundaries of the farms' holdings changed little in the rest of the 19th century. In blocks 1 and 4, rented by John Foster and John Hutchinson respectively in 1841 the overall *Night Soil Ranking* is less than 7 (groups 1 and 2). John Hutchinson's holding is known to have been mainly arable in 1841 (Figure 7), though

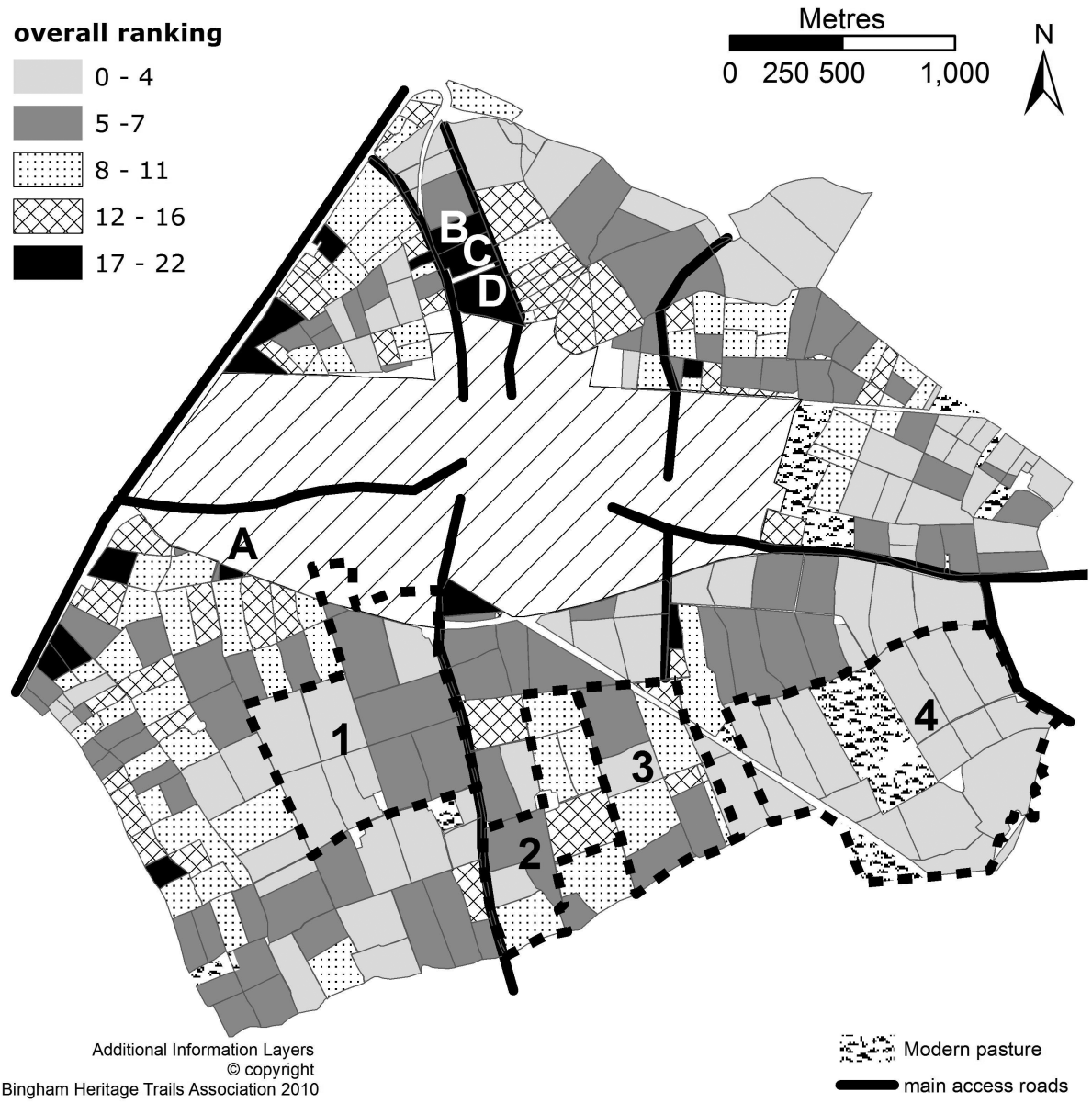

FIGURE 9: Overall night soil rankings for the parish, 1 to 5 from the lowest to highest. Numbers in the key are the sum of the scores for each of the five individual components that make up the assemblage. The four numbered areas are contiguous blocks each rented by a single farmer. Four fields referred to in the text are lettered A to D. The heavy lines are roads known to exist in the 19th C. The field boundaries are from the 1883 OS map. Built-up Bingham and the areas of modern pasture are as in Figure 5.

crop rotation is known to have been practiced, while John Foster's was about one third meadow at the same time. Foster also rented a single field near the site of the village dump. These values do not seem to be higher than one would expect from the spread of farmyard manure that contained an element of domestic waste in it.

Blocks 2 and 3 are different. These were rented by George Skinner and William Wright respectively

in 1841. Both holdings were entirely arable in 1841 and show a range of *Night Soil Rankings* up to 16, with more than half of the fields in the 12 -16 group. Both of these tenants also had single fields within the area of the village dump where the highest concentrations of night soil occur (B and C respectively in Figure 9; 0208A and B in the database). It is considered that these farmers may possibly have used night soil as a fertilizer, in each case using the fields B and C, where the highest concentrations of night soil assemblage occur, as a dump for the night soil to mature prior to spreading it and quite possibly by taking advantage of the fact that they were permitting these fields to continue to be used as the village dump.

CONCLUSIONS

The finds distribution maps show that while open field farming might have been used centuries earlier, the land-use plan that is evident on the map of 1586 probably originated no earlier than the mid to late 15th century coincident with the manor being bought by the Stapleton family. About a century earlier, some land in the northern part of the manor was enclosed as demesne land, either for stock rearing or to constrain stock on arable land during the winter.

Changes in parts of these open fields from arable to pasture in the late 16th C are also shown on these maps and may be a consequence of a reduction in the availability of labour resulting from the plague outbreaks in the county in 1592 –1593. Much of this land remained as pasture until the end of the 18th century, but the distribution of finds suggests that throughout the 19th and 20th centuries rotation between arable and pasture was widely practiced.

The basic assumption that high concentrations of finds mark the proximity of habitations is shown not to be valid for the post-medieval and modern periods when alternatives to dumping rubbish near homesteads can be demonstrated. These include using designated village dumps and the deposition of household night soil and solid rubbish in rented fields far away from the homes.

The site of one village dump, located on common land, was active from the second half of the 15th century to the late part of the 19th century. Despite redistribution by modern ploughing, finds distribution maps show how the locus for dumping changed with time.

There seems to be an association of stoneware, china (porcelain)/earthenware, clay pipes, glass and oyster shells in many fields. This has been interpreted as a night-soil assemblage; that is all five elements came together as solid rubbish added to night soil.

Dated finds in this assemblage can be used to show that the village dump ceased to be used in Bingham in the second half of the 19th century. This is possibly because of changes in the law as well as a consequence of enclosure. After this the dumping of night soil appears to have become the responsibility of the individual householder. Many householders used either the sewers in the street or pits in their gardens for the disposal of their waste, but the high concentrations of the night-soil assemblages in some fields show that tenants and freeholders who were able to rent small fields well away from their homes probably used them for the disposal of their night soil. Nearly all of these fields were located alongside roads.

There is some indication that medium to high concentrations of field-walked finds can be used to identify fields in which night soil was used as a fertilizer. This is clearly indicated in fields of two of the large farms. High concentrations of the night-soil assemblage in the vicinity of the village dump are possibly explained by individual farmers storing night soil there prior to spreading it as a fertilizer in their fields.

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