98/26

LINDSEY ARCHAEOLOGICAL SERVICES

Market Deeping Rising Mains

Towngate Sewage Pumping Station - Deeping St. James STW

Archaeological Desk Top Assessment and Fieldwalking Survey

NGR: TF 1330 1080 – TF 1730 0897
Site Code: MDM 98
LCNCC Museum Accn. No. 262.98

Report prepared for

Anglian Water Services Ltd

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EVENTS L12398 L12399

SOURCES L12399 p-2, 22-dd

SOURCES L17034 L17035

35403	L182037
35404	L182038
35405	L182039
35406	L182040
35407	L182041
35408	L182042
35409	L182043
35410	L182044
35411	L182045
35412	L182046
35413	L182047
35414	L182048
35415	L182051
35416	L182053
35417	L182054
35418	L182055
35419	L182056
35420	L182057
35421	L182058
35422	L182059
35423	L182060
35424	L182061
35425	L182062
35426	L182063
35427	L182064
35428	L182065
35429	L182066
35430	L182067
35431	L182068

34056 L134056

Contents

Fig. 1 Location of Market Deeping and Deeping St. James (inset C based on the 1983 and 1986 Ordnance Survey 1:25,000 maps, Pathfinder Sheets TF 00/10 and TF 01/11. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A.

Fig. 2 Proposed Route of the Rising Main from Towngate Pumping Station, Market Deeping to Stowgate Road, Deeping St. James. Positions of boreholes are indicated. (Based on a plan by A.F. Howland Associates. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

Fig. 3 Proposed Route of the Rising Main from Stowgate Road to Station Road STW, Deeping St. James. Positions of boreholes are indicated. (Based on a plan by A.F. Howland Associates. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

Fig. 4 Market Deeping: Composite map showing sketch plot of cropmarks identified from air photographs, and locations near the proposed pipeline route of known archaeological remains. Cropmark plot based on information © Crown Copyright, RCHM(E). Reproduced with consent. Map based on the 1905 Ordnance Survey 1: 10,560 map sheets TF 11SW, 11 SE and 10 NE. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

Fig. 5 Deeping St. James: Composite map showing locations near the proposed pipeline route of known archaeological remains. Reproduced with consent. Map based on the 1905 Ordnance Survey 1: 10,560 map sheets TF 11SW, 11 SE and 10 NE. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

Fig. 6 Location of Prehistoric and Roman finds from the Fieldwalking Survey along the proposed pipeline route. Field numbers as assigned by LAS. Based on the 1: 2,500 plan supplied by Anglian Water Services Ltd; © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

a) Fields 1-7
b) Fields 8-17
c) Fields 18-31
d) Fields 32-38
e) Fields 39-41

Fig. 7 Location of Medieval and Post-medieval finds from the Fieldwalking Survey along the proposed pipeline route. Field numbers as assigned by LAS. Based on the 1: 2,500 plan supplied by Anglian Water Services Ltd; © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

a) Fields 1-7
b) Fields 8-17
c) Fields 18-31
d) Fields 32-38
e) Fields 39-41

Market Deeping Rising Mains

Towngate Sewage Pumping Station - Deeping St. James STW

Archaeological Desk-Based Assessment and Fieldwalking Survey

NGR: TF 1330 1080 – TF 1730 0897
Site Code: MDM 98
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Summary

a) Desk Based Assessment

The proposed route of the new rising main passes through an area which has produced numerous finds dating from the Mesolithic to Romano-British periods. The route lies to the east of the Roman road King Street and crosses both the Car Dyke Roman canal and a Roman artificial channel of the River Welland as well as a droveway. The abundance of communication links is reflected in Iron Age and Romano-British settlement sites; at least one saltern site is known close to the route. A Roman ritual site may be in the close vicinity of Frognall. There may be medieval peripheral settlement features beneath pasture at Frognall. There has been no recent survey within this area but the Fenland Survey examined land to the east in considerable detail, providing a context for this project. The route lies to the west of most recorded air photographic features but this partly reflects river alluvium cover, apparently up to 1m thick along much of the proposed route. Analysis of cropmark features indicates an Iron Age or Roman droveway crossing the route west of Sheepskin Hall Farm, and a possible Roman crossing point where the modern road crosses Car Dyke. A circular cropmark feature, perhaps a Bronze Age burial site, may be affected by the pipeline SW of Five Houses. Borehole data may indicate a previously unknown saltern site up to 2m deep beside Linchfield Road. Known archaeological finds probably reflect higher areas within this terrain where alluviation has been least and where ploughing has been most destructive. There is potential for well-preserved archaeological sites with environmental preservation.

b) Field Walking Survey

Field collection of artefacts along the proposed route resulted in the retrieval of three worked flints, 52 Romano-British pottery sherds and 25 medieval sherds. Only two distinct Roman scatters were found, each evidenced by a thin spread of pot sherds. At Prior's Meadow the finds coincided with gravel exposures. No Roman finds were made near Hall Meadow but a site was identified west of Sheepskin Hall. Roof tile reflected a similar pattern, with three scatters of Roman tile (at Sheepskin Hall, east of Hall Meadow Road and on Prior's Meadow. An unusually high number of post-medieval sherds was collected (75), probably the result of manuring and affected by the proximity of roads to much of the route.

Introduction

Lindsey Archaeological Services (LAS) was commissioned by Anglian Water Services Ltd in November 1998 to produce a desk-based assessment and a fieldwalking survey of the proposed route of a new 300mm rising main linking Towngate Sewage Pumping Station, Market Deeping with an existing sewage treatment works at Station Road, Deeping St. James (Fig. 1). Part of the route south of Frognall will run alongside an existing rising main. The assessment and evaluation have been conducted in accordance with the Project Brief (dated September 1998) and the general requirements of the Archaeology Section of Lincolnshire County Council as set out in the *Standard Brief for Archaeological Projects in Lincolnshire* (August 1997).

The purpose of the desk-based assessment was to

- establish the presence or absence of known archaeological remains and their location on or beside the proposed pipeline route and to identify the potential for further unknown archaeological remains

The purpose of the fieldwalking survey was to

- determine the date and extent of any remains present on the ground surface, subject to suitable ground conditions

- provide the necessary data to enable mitigation or the level of further archaeological investigation prior to the proposed groundworks to be determined

Site Location and Description

The proposed pipeline route passes along Towngate Outgang Road, Market Deeping and then into adjacent farmland (Figs. 1-3). At Hall Meadow Road the pipe is to be laid in the eastern verge for a short distance and thin in fields to the east as far as Spalding Road. The proposed route then passes through pasture fields in the settlement of Frognall before turning SE in arable land past Deeping St. James to the Station Road STW. Of the 5km route, approximately 4km crosses farmland where a 20m minimum easement width is expected; the remainder will be in the roadside verge or in village streets.

1) The Desk Based Assessment

Method

A study area of a 1km corridor centred on the route was used. Consultation with the following sources was made:

- Lincolnshire County Sites and Monuments Record, including data collected by the Fenland Survey
- South Kesteven Community Archaeologist's records
- National Mapping Project sketch plots of air photographs
- Lincolnshire Archives Office - Enclosure, tithe and parish maps and other documentary sources, as appropriate
- Lincoln Central Library Local Studies Collection
- Site visit to verify site conditions and assess any modern disturbances along the route

Archaeological Background (Figs. 4 and 5)
The national and regional archaeological importance of the Welland Valley has been recognised since the late 1950s (RCHM 1960). Exploitation of the gravel and alluvium-derived soils is known from the Mesolithic period onwards and a glimpse of the complex palimpsest of Bronze Age and later overlain sites has been recorded on air photographs.

The Fenland Survey
The parishes of Market Deeping and Deeping St. James were included within the South-West Fens study area of the Lincolnshire Survey by The Fenland Project in 1984-5 although only part of each parish was surveyed (Hayes and Lane 1992, 182-191). The Fenland Project, funded by English Heritage, included the results of fieldwalking and a consideration of previously reported findspots as well as archive and cartographic sources. Their report highlighted a particularly high archaeological potential for the area around Frognall.

The proposed pipeline route is across land outside the area fieldwalked by the Fenland Survey except for a small area west of Sheepskin Hall. Roman, Middle and Late Iron Age finds were recovered by the Fenland Survey in the near vicinity of the pipeline route. Prior's Meadow was recognised to be an area of archaeological importance but could not be included in the survey because of time constraints.

The Survey provided useful information about the landscape and occupation of the area. It demonstrated that marine alluvium, both silts and clays, are seldom encountered in The Deepings, unlike elsewhere in the South Lincolnshire Fens. Instead, the dominant material is gravel, probably of Ipswichian deposition, overlain by patches of peat and clayey river alluvium from the Welland. Palaeochannels within the early gravels have broken the original ground surface into an uneven terrain with the higher points exposed through the more recent but poorly dated alluvial cover. On these unmasked areas archaeological material pre-dating the alluviation has been found.

Mesolithic, Neolithic and Early Bronze Age
Mesolithic activity in the area covered by the two parishes is likely to have been very limited. The Fenland Survey found no further finds to add to the possible Mesolithic blade implements found east of Deeping St. James at SMR **33459**. This findspot is within 100m of the pipeline route.

The flints were found in a scatter of mostly Neolithic flint implements, and the site is likely to be of that later date. A single certain sherd of Neolithic pottery was recovered by the Fenland Survey from a mixed period assemblage beside Towngate Outgang Road at SMR **34045**, 320m east of the pipeline route. This was the only Neolithic sherd found in the SW Lincolnshire Fens; flint scatters were more common but none was found close to the route. Prior to the Survey, a stone axe and a leaf-shaped flint arrowhead had been found at Frognall (SMR **33448-9**) 400m east of the pipeline route.

Several barrows (burial mounds or the ploughed-out sites) are known, especially in a fen-edge scatter at the edge of Deeping Fen. A single barrow

has been recorded in Deeping St. James close to the River Welland. The Survey considered that there was extensive human activity around The Deepings from the mid-Neolithic, increasing in the Early Bronze Age. Contemporary pottery was found NE of Frognall on a silt ridge beyond river alluvium deposits.

Middle Bronze Age, Early, Middle and Late Iron Age
An apparent decline in activity has been inferred from the scarcity of pottery of the Middle and Late Bronze Age. This may be a real decline (from about 1850 BC) related to drainage deteriorating as sea level rise affected the adjacent fenland, or a misleading impression produced by later river alluvium masking the occupied ground surfaces. Pottery of this date rarely survives in the ploughsoil for long.

To the NE of Frognall, 45 sherds of pottery thought to be Late Bronze Age or Early Iron Age (1000 - 400 BC) were found, apparently pulled by deep ploughing from an horizon buried by river alluvium. That site may be evidence of resettlement close to the fen edge beginning.

A later stage in the process of reoccupation in this area is marked by Middle Iron Age sites to north and south of Towngate Outgang Road, between 150m and 450m east of the pipeline route. Air photographs show a linear ditched feature aligned SW-NE which crosses below the road west of Sheepskin Hall, with enclosures on either side. The feature probably represents a droveway at least 3km long, passing close to a population centre. A local trade may well have included salt; saltern features have been recorded at SMR **34066**, Hall Meadow. SMR **34045** was characterised by pottery pre-dating 150BC, but the nearby sites of SMR **34043-4** and SMR **34066-7** (Hall Meadow) also contain large quantities of Romano-British sherds. On both the latter sites, an absence of pottery dating between 150BC and 100 AD was noted, perhaps indicating a second abandonment phase although it might represent a local pottery style which has not been recognised. Assuming that the centres of these occupation sites have been identified, the pipeline may encounter peripheral features.

A Late Iron Age gold coin was found before the Survey between Frognall and Deeping St. James (SMR **34074**), 100m west of the pipeline route. It has been interpreted as evidence for a contemporary occupation site in this vicinity, perhaps developing into the large Roman site known on Prior's Meadow (SMR **30047).**

Roman
In addition to the ditched droveway crossing below Towngate Outgang Road, another local transport link in the Roman period was the Car Dyke. This feature, which crosses the proposed rising main route in Market Deeping, has been interpreted for many years as the remains of a partly artificial Romano-British watercourse leading from Lincoln to Cambridgeshire. The extent to which it was used as a canal has been disputed, but it almost certainly served as a navigable route and was probably used for some trade of bulky materials. The two features probably had some association, with the

droveway exploiting the fen-edge and fen but providing access to the inland zone. A concentration of Roman metal finds, particularly brooches, at SMR **34695** 500m east of Car Dyke may mark an occupation site between the canal and the droveway, now mostly covered by development. The pipeline route passes 50m from this findspot.

The occupation sites at SMR **34054-6** (Sheepskin Hall), **34066-7** (Hall Meadow) and those north of Towngate Outgang Road, **34043-4** and **34045** could possibly represent a single extensive complex although present indications are of separate concentrations.

The intensity of Romano-British activity within a 1km radius of Frognall is extraordinary. Prior's Meadow, south of Frognall and east of Deeping St. James, appears to have been crossed by a 30m wide artificial watercourse **DSJ15**, aligned NE-SW through an existing alluvium-filled natural depression. This watercourse was discovered by the Fenland Survey from a combination of air photograph study and fieldwork, and confirmed by a recently cleaned drainage ditch which helpfully revealed a 90° section across it (Hayes and Lane 1992, 189). The pipeline route will cross this feature, probably immediately south of Stowgate Road although this stretch is not identified.

An extensive settlement site at Prior's Meadow (SMR **30047**) must be associated with the artificial watercourse, and its location demonstrates the importance of water-borne trade in the local Romano-British economy. The site probably incorporates several distinct foci; nine dense pottery scatters are marked on a 1971 plan which shows the site. Fenland Survey examination of air photographs identified a 9ha total area of the Prior's Meadow site. In addition, three ritual-crown fragments and two hoards of 515 and 3000 coins have been reported to the NW. The edge of fenland appears to have been a zone of ritual or religious concentration, perhaps because of the vulnerability of local settlement to flood episodes. The pipeline will pass within 200m of the Prior's Meadow site, and also between that site and the reported metalwork findspots.

Saxon

The Fenland Survey identified no Saxon sites or pottery sherds, contrasting with the 2000 Roman sherds collected in the two parishes. The information relates only to the eastern part of the parishes but demonstrates an apparent abrupt change in the level of activity at the fen edge. This may have been partly occasioned by the end of maintenance of the artificial watercourse through Prior's Meadow which presumably served to reduce the frequency and damage of river floods. The fact that this channel ceased to be a landscape feature shows the extent of silting and aluvium deposition within and beside it, eventually causing the river to flow further south. The conditions which encouraged this may have produced phases of peat growth; small pockets of peat remain although much may have eroded away.

Saxon settlement is believed to have been sited closer to the Car Dyke than the known Roman sites, probably forming the basis of the medieval and later settlements. It is unlikely that the pipeline route will reveal any Saxon

settlement sites; cemeteries are possible although not expected on current information.

Medieval

Medieval settlement seems to have developed from the Saxon communities close to the Car Dyke. A medieval document, purporting to be evidence for the creation of Deeping St. James township before 1130 AD, describes the enclosure of lands east to Car Dyke, then beyond it to '*Cleilake*' outside '*Cranmor*' (Hayes and Lane 1992, 190-1). In order to achieve this, the Welland was embanked to prevent regular flooding, then dwellings were built on the bank using the fertile surrounding ground as meadows and fields.

The pipeline route lies 200m east of Eastgate Backside. This lane appears to define the rear of strip fields behind the Deeping St. James linear settlement, and no medieval features are expected in this area. However, the route passes through the centre of Frognall, a settlement known in 1139 as *Frokenhale*. There is evidence here for pre-eighteenth century enclosures south of the road into Deeping St. James and these may originally have been the sites of medieval dwellings. Medieval features including structural remains, boundary ditches and rubbish pits could be present here.

Air photographs show traces of ridge and furrow beside the pipeline route east of Deeping St. James, as well as at Frognall, west of Sheepskin Hall and immediately east of the Car Dyke. To the SW of Frognall, ridge and furrow is visible in pasture where the route passes between developed areas.

The present course of Towngate Outgang Road is likely to follow a medieval road towards the fen-edge. The pipeline trench will probably reveal metalling deposits below the modern surface although dating the earliest material would be difficult or impossible. Within Market Deeping the trench will pass near to a fourteenth century market cross base; English Heritage has noted that archaeological deposits relating to the monument's construction and use may survive intact around it.

The Market Deeping/Deeping St. James parish boundary will be crossed on Towngate Outgang Road, east of the Car Dyke. The survival of any bank or ditch marking the boundary would be of interest if it were present.

Post-medieval

The pipeline may reveal post-medieval features anywhere along the route. The most common form of post-medieval feature will be backfilled drainage and field boundary ditches with associated banks. These will be easily identified and may be dateable either by cartographic evidence or by material within their fills. Small ponds may also be present. At Frognall the proposed route passes across known gravel quarries marked on the 1815 Enclosure map; adjacent fields may also have been quarried (LAO Kesteven Award 22).

A pound for stray animals is marked on the west side of the Car Dyke on a map revised in 1903 (OS 1905).

At Sheepskin Hall there may be features associated with the farmyard and possibly demolished outbuildings. A pond shown on the map of 1815 coincides with a scatter of building rubble seen during the fieldwalking survey.

Wartime Installations
The route passes close to the cleared sites of RAF Langtoft, a World War II radar station and pill box destroyed during the 1950s (SMR **34961**). No wartime military features are known to be directly affected by the project. Pillboxes and other structures are increasingly recognised as significant features of historical and archaeological interest, and remains might be found on or beside the route.

Existing pipeline
An existing 375mm diameter rising main from Deeping St. James joins the proposed pipeline course Frognall. At present it is unclear how close the new main will be to the existing backfilled trench; a gap of 6m or more is probable. Where the gap is this close, installation works for the existing pipe may have caused considerable contamination to archaeological deposits, although sites would probably have survived to some recognisable extent.

Scheduled Ancient Monuments
Three sites in the vicinity of the proposed pipeline have been scheduled by the Secretary of State under Section 1 of the Ancient Monuments and Archaeological Areas Act 1979 (as amended), and receive statutory protection. LAS understands that English Heritage will be contacted by Anglian Water Services advising of the proposed route and seeking comments.

SMR **33436**, the fourteenth century base of a village or pilgrim's cross at Towngate crossroads, has been designated SAM 22668. It is also a Grade II Listed Building 12/185. The description of the monument notes that the shaft is more recent, but the badly mutilated socket stone remains in situ 0.1m below the surface. Archaeological deposits may survive intact around this feature.

SMR **34066**, the Middle Iron Age settlement site on Hall Meadow is designated SAM 20811. SMR **30047**, the Roman settlement site on Prior's Meadow, is SAM 179.

Borehole Data (Fig. 2)
The results of trial boreholes taken at intervals along the proposed route became available after completion of the fieldwalking survey. The boreholes were drilled by A.F. Howland Associates on behalf of Anglian Water Services Ltd (Simpson and Howland 1998). The interpretation below has been made by LAS using information on the borehole logs provided in that report.

At most of the borehole sites, modern topsoil is present to a depth of between 0.1m and 0.5m. No topsoil was recorded at BH6 or BH11, and made ground was present to the surface at BH2 and BH5 (as well as within the Station Road STW compound). Where topsoil is thickest, it may represent an

undetected merging with the underlying deposit where this is of a similar colour; with a dark topsoil this could indicate gleying. Gleying occurs when organic matter decays in waterlogged conditions, producing a grey appearance to the soil.

Deep disturbed deposits were recorded at BH5 (east of Linchfield Road). This field is a pasture field occupied by pigs. Air photographs show possible west-east ridge and furrow in the same field. A broad drainage ditch runs along the western side of Linchfield Road, close to the borehole location. The base of the gravel deposits dip in this vicinity to their lowest in the route boreholes, apparently reflecting an ancient natural depression or channel. The surface of the gravel seems to have a similarly dipping profile, and it is significant that the drain is located here. Two suggestions can be made for the 1.9m of deposits incorporating what the geotechnical company refer to as brick fragments. The first is that the site between two roads was used as a gravel quarry for road construction and has since been backfilled. Choosing a location where the gravel is actually deeper than elsewhere seems unlikely. The other possibility is that relatively recent land use has produced minor disturbance and has fortuitously overlain remains of an Iron Age saltern site with 'briquetage', the fired clay debris of vessels and supports found in quantity on salt-making sites. An Iron Age saltern (SMR **34066**) has been recorded and partly investigated at Hall Meadow, 1.5km to the east. That site contained an entirely backfilled ditch or channel 18m wide and 2.4m deep, presumably providing a tidal supply of salt water. Archaeological deposits there exist to 1.5m below ground level. A similar situation could be present at BH5, with the added potential for survival that this field is not regularly ploughed. Unfortunately this field was not suitable for fieldwalking.

The other borehole logs indicate clay soils below the topsoil at most locations. These soils are recorded as about 1m thick at six locations, with a base at about 3.35m OD. The uniformity suggests an alluvial deposit masking a buried land surface at about 1m below the present ground surface. The borehole logs distinguish up to three layers within this clay, possibly reflecting a series of separate flooding episodes.

With the exception of the Station Road STW compound, assumed for these purposes to have been disturbed already and unlikely to have surviving archaeological remains, no boreholes were drilled south of BH11 (on the north side of Stowgate Road. This borehole encountered clay to 1.8m below ground level (2.72m OD). The deeper deposits may mark the northern edge of a suspected east-west natural depression, adapted by the Romans for an artificial course of the River Welland **DSJ15**. The projected line of this feature is about 100m south of the road.

Air Photographic Cover (Fig. 4)
Air photographs covering the OS map squares TF 11 SW, 11 SE and 10NE were examined by Rog Palmer as part of the Fenland Mapping Project after completion of the Fenland Survey. The sketch plots of identified archaeological features are held by the RCHM(E) but copies of TF 11 SW and SE were available for study at the South Kesteven Community

Archaeologist's office. A copy of TF 10 NE was supplied by the RCHM(E). The sketch plots are at 1:10,560 scale.

The plot shows two parallel linear ditches extending from the east side of the Car Dyke and leading NE with very slight curves for at least 3km. The droveway is flanked by dense rectangular enclosures, especially on its southern side. Some are apparently fields, but others might be around habitation sites. The droveway follows a slight ridge visible from ground level south of Towngate Outgang Road, and is crossed by that road immediately west of Sheepskin Hall Farm. The saltern site and Iron Age/Roman settlement to the NE of Hall Meadow Road is some distance from the droveway but may be part of that complex. Close to the Car Dyke the slightly sinuous droveway changes angle and heads directly for the point where Towngate Outgang Road crosses Car Dyke. It is even conceivable that the modern road through Market Deeping which lies on the same course is a continuation of the droveway. The implications of this are important: the present crossing point of Car Dyke may be on a Roman crossing point, presumably a bridge, and to the west the modern road may overlie a Roman or even Iron Age trackway. If the crossing point survived from the Roman to medieval periods, then there is some potential for Saxon occupation beside it.

A causeway is recorded as crossing the fen to Spalding around the early fifteenth century (Hayes and Lane 1992, 172). The documentary source claims that the road, of logs and sand, was constructed by Egelric in the late twelfth century, but no location is given. It is believed that the road was an improvement of an earlier causeway which led across Deeping Fen, perhaps from Baston, but there seems no reason why it could not instead have led from the Deepings. Hayes and Lane suggested a conceivable route below the modern A16 road, or skirting the River Welland on a route now occupied by minor roads. Could the cropmark droveway have remained in use until construction of Towngate Outgang? Its alignment could well coincide with that of the A16 NE of Wensor Castle Farm, and both Sheepskin Hall Farm and Swines Meadow Farm lie beside the droveway.

Several circular ditched features have been identified from cropmarks, and some or all of these might represent Bronze Age burial sites. The close proximity of the droveway to some of these features may mean that it was deliberately aligned along upstanding mounds which have since been flattened. A circular feature is plotted SW of Five Houses, about 30m south of the modern road, and could lie within the pipeline easement.

The cropmark plot shows no features alongside Hall Meadow Road despite an extensive complex 400m further east. That complex appears to extend further west, but resolution of features is vague; this could indicate thick alluvium is masking the full extent of the site.

An equally dense complex of enclosures and ditches is plotted SE of Frognall village centre. This appears to be a discreet settlement focus despite its proximity to the Prior's Meadow site.

The Prior's Meadow site is represented on the cropmark plot as a row of large almost square fields with a trackway to the south. An isolated circular ditched feature is plotted north of the fields, separated from them by a long linear ditch. No features have been identified within 300m of the proposed route but this probably reflects Welland alluvial deposition to the west. This cropmark site is separated by 700m without plotted features before another more extensive complex to the SE. The intervening area coincides with the recorded position of the artificial Roman channel of the Welland, and the blank area is presumably masked by alluvium.

2. The Fieldwalking Survey

The fieldwalking survey was conducted by LAS staff on 26th November 1998 after access arrangements had been made on their behalf. The weather was overcast but dry, after early morning drizzle. Most of the available land had been ploughed and some had been recently drilled for a new crop. With the exception of two fields occupied by pigs, one set-aside field and one field with a brassica crop, all non-pasture land was examined. Fieldwalking conditions were ideal on much of the route and good on most of the remainder.

Fieldwalking is carried out on land that has been recently ploughed or sown, to retrieve artefacts such as worked flint or pottery disturbed by plough action, etc., whose spatial distribution can indicate zones of occupation beneath the ground surface. The work creates no disturbance to land or crops other than passage on foot.

Method

All of the available route easement was walked by teams of two experienced archaeologists. In Deeping St. James a team of three archaeologists was used where the route position is unconfirmed. Fieldwalking began on the eastern outskirts of Market Deeping in Field 3 and moved along the route to the Station Road STW in Deeping St. James. Field 4 was 'set-aside' and only part of the ground surface was visible. Fields 12 and 13 and the western side of Field 15 were not suitable for fieldwalking. A single transect was walked in the field east of Hall Meadow Road at 18, in order to determine if artefacts extended this far west from the known site. Field 24 was used to include three small cultivation blocks. At Frognall, LAS had specific instructions not to enter pasture fields 27 and 28. Fields 29-31 were also under pasture (31 contained horses) and were not walked. At Station Road, the STW and the paddock to the east were not entered.

Transects were walked at 10m spacing from west to east or north to south, with no transect within 10m parallel to a field hedge or ditch; there was clear evidence of dyke cleaning material spread within the 5m closest to ditches.

Finds were bagged within individual fields along each transect at 20m intervals. Each fieldwalker used a 20m nylon cord with a short cane at one end; the cane was placed at the start of each interval and when the 20m had been walked, any finds were bagged and labelled. The cord was then pulled and the cane replaced at the start of the next collection segment. The distance between parallel transects was measured by pacing, and checked by pacing at intervals.

The retrieval policy was intended to recover any material which would indicate post-medieval or earlier occupation. All prehistoric, Roman and medieval material was collected. Most post-medieval but not modern debris was collected but a dense concentration of post-medieval building rubble was noted. Animal bone was not collected, because it is not readily dated in isolation.

Labelling of finds was designed to fit into a scheme of recording which could be used throughout the project but which would allow scatters of finds found from the fieldwalking to be evident when mapped. A museum accession number and site code was obtained from the Lincoln City and County Museum. The number is used for archiving purposes, the site code prefixes all numbers labelled on the finds. The route was divided into 40 distinct 'plots' (including road crossings), a method used successfully by LAS since 1992. Each plot corresponds with a field unit marked on the modern OS 1:2,500 plan of the route. Even where divisions have been removed, the field units usually remain obvious on the ground. Field numbers 9 and 10 were not used.

To enable accurate plotting, each continuous transect along the easement area within each plot was assigned a letter (A = 10m from road hedge or ditch, B = 20m, C = 30m). Each collection interval was indicated by the distance from the start of the plot. For finds marking and plotting this information has been simplified into sequential lower case letters (no more than 26 collection points were present in any plot). Uppercase letters remain available for subsequent finds collection. An example of a find collection label for a hypothetical assemblage from fieldwalking a 20m long transect in Plot 12 is: *MDM 98 12b*.

After finds cleaning and labelling, artefacts were examined by period specialists (Apps. 2-4). The results have been plotted by period onto maps at a scale of 1:2,500 (Figs. 6 and 7).

The Results

The oldest recovered finds were prehistoric flints; very few flints were collected although the flinty nature of the underlying gravel means that much poor quality flint is available. Of the seven flints retrieved, one appears to be a Neolithic core (found just north of Frognall), two may be struck flakes, and one is a possible post-medieval gunflint. A burnt flint lump was recovered from Prior's Meadow. Other flints may not have been worked; all flints will be submitted for specialist identification at a later stage of the project. There was no evidence of worked flint close to the previously recorded Mesolithic and Neolithic site south of Frognall (SMR **33459**).

No prehistoric pottery was found, which may accurately reflect the range of occupation on the exposed sites or may instead be the result of early fabrics fragmenting when exposed to fertiliser, air and frost action.

54 sherds of Roman pottery were found, in only four of the fields walked. The date range for the entire assemblage was mid/late second century to mid/late third century and a similar range was present within each of the scatters. No first century or fourth century pottery was present. The restricted date range could be affected by alluviation protecting earlier deposits or by settlement responding to drainage changes throughout the Roman period. The most interesting find was a sherd of Dorset-made Black Burnished ware (BB1) from Field 14, findspot b. This ware is rare in this area.

One sherd of Roman pottery was found in Field **8**, perhaps associated with the droveway which crosses that field. Nineteen sherds were found in the next field surveyed to the east, **14**, coinciding with the dense cropmarks of enclosures beside the droveway. Close to Hall Meadow Road, no Roman sherds were recovered.

No fields could be walked in Frognall itself but eighteen sherds were found in Field **34** and sixteen in Field **35**. These two fields north of Stowgate Road are apparently within the known Prior's Meadow occupation site (SMR **30047**). The absence of any finds further south suggests deeper alluvium cover, as indicated by the borehole data. No metal finds were made.

Saxon finds were absent from the fieldwalking, and this confirmed the impression of previous fieldworkers that settlement of the fen edge here had been abandoned during the Roman period, perhaps as a result of climate deterioration and a breakdown of measures used to control river flooding. Two sherds which might be as early as twelfth century were found in Field **34**, but most finds were of thirteenth century date. About twenty medieval sherds were found, mostly where the route is close to Deeping St. James. This is the product of domestic waste being spread onto fields surrounding the settlement and does not indicate the presence of an archaeological site.

Post-medieval pottery was very abundant, 75 sherds being recovered. The distribution of this reflected contemporary settlement and has the same origin as the medieval finds. Five fragments of seventeenth or eighteenth century clay tobacco pipe stems or bowl were collected. These probably represent breakage during use by agricultural workers and are not of archaeological significance in the context of this project.

Archaeological Potential of the Proposed Pipeline Route

The fieldwalking survey confirmed the impression of the air photographic information that enclosures alongside the droveway close to Towngate Outgang are probably Romano-British features. There is clearly an archaeological site on the proposed pipeline route west of Sheepskin Hall. Another site of similar date was found on Prior's Meadow, forming part of the known settlement site. Both of these sites can be expected to produce occupation features with dating evidence. Close to Prior's Meadow the previous discoveries of ritually associated metalwork hint at a site such as a temple or shrine.

In addition to the sites where ceramic remains were collected, ridge and furrow earthworks were identified at ground level in pasture on the Parslins at Deeping St. James. There is a possibility that the ridge and furrow overlies earlier remains.

Although the pipeline will cross the Car Dyke at what appears to have been an ancient crossing point, existing disturbances either side of the Roman canal have probably removed all trace of any early bridge.

The apparent absence of archaeological remains elsewhere along the route is probably misleading. The borehole data indicates alluvial cover, which appears to be sufficient to mask archaeological features. Topsoil stripping will reveal some features which can be examined, but often only the pipe trench will expose remains at depths unsuited for investigation. Here, the trench itself will produce limited damage to the archaeological site.

Environmental preservation

Recent archaeological excavations have taken place at Welland Bank Pit (400m SE of the Station Road STW) and along the line of the Market Deeping Bypass (west of Deeping St. James and NE of Market Deeping). These have shown organic survival from the Late Bronze Age, including wooden artefacts and animal bone. At Welland Bank Pit, alluvium cover of 0.3 – 0.5m produced what the excavators described as 'remarkable preservation' of deposits (Taylor 1997, 55-56).

Peat deposits may be present in pockets along the route; peat has been identified during work at Horsegate (Spalding Road, west of Frognall) (Simmons 1995). However, in November 1998 at Frognall, a trench was excavated for a recent sewer repair 200m west of the route and showed a soil sequence of topsoil above sandy loam, above sand. Where peat has not been eroded, particularly high organic preservation may be found. Peat deposits will also produce important information about the local environment in antiquity.

Conclusion and Recommendations

It would be difficult to identify a route entering the Station Road STW from the north which entirely avoided the Prior's Meadow archaeological site. Equally, any route to the west of Market Deeping will cross the droveway and enclosure complex known from air photographs. LAS understand that the new main will be laid above ground at the Car Dyke crossing point, and this will avoid damage to the Roman canal.

From the sparsity of finds recovered from the field surface on Prior's Meadow, it is possible that the proposed route only affects the periphery of the settlement (centred about 250m to the east). In this particular instance, a close correlation was noted between Romano-British finds and disturbed gravel, which suggests that the archaeological features are protected from regular plough damage by post-Roman river alluvium. Other possibilities for the phenomenon are that a discrete site exists on a slight knoll not covered by alluvium, or that the cluster is the result of the existing rising main.

Masking of early ground surfaces by river alluvium is a potential problem for assessing the impact of the proposed works along all of the route, especially south of Frognall where the present course of the River Welland is closest. The artificial Roman course may also have passed across the route to the south of Stowgate Road. There is, however, some archaeological evidence that at least in places the effects of such alluvium cover are minimal. The Mesolithic flint scatter 400m NW of Stowgate Road (SMR **33459**) is unlikely to

derive from far below the present surface (although the findspot is close to a field ditch), but in this instance the scatter is described as on a slight rise.

The fieldwalking survey has identified two Roman sites on the proposed route, both of which were also indicated from air photographic or previous finds information. The Assistant County Archaeological Officer has intimated that archaeological sites revealed during topsoil stripping along this pipeline would warrant preservation by record in advance of damage by vehicles or trenching. Archaeological excavation will probably be unavoidable at the droveway crossing (west of Sheepskin Hall) This scatter produced the locally rare Black-burnished Roman sherd. He has suggested that deflecting the route around the sites elsewhere which are unprotected by alluvium would reduce the damage and the level of investigation required. In order to consider such a route variation, it would be necessary to determine the edge of the unprotected remains, probably by geophysical survey at the locations where finds are known. The easement could then be relocated to where alluvial cover becomes too thick for identifying underground features. In the event that this avoidance strategy is impossible, detailed recording of the easement area would be needed. In view of the potential nature of some of the anticipated sites (Roman settlement, possible Roman ritual site) archaeological investigation could be time consuming.

For the remainder of the route, where alluvium may be about 1m thick, the appropriate level of input is likely to be limited to recovering information about presence or absence of archaeological remains and dating material where possible. This can be done from the stripped surface, measuring and photographing part of the trench face. The collection of environmental data in these conditions could also be useful.

Topsoil stripping is likely to reveal further remains, some of which may justify investigation: a flexible work programme by the contractors will be needed. A watching brief during topsoil stripping and trench excavation is likely to be necessary.

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LAS is grateful to the RCHM(E) for permission to reproduce the air photograph sketch-plotted features (part of Fig. 3).

The LAS fieldwalking team consisted of Rob Armour-Chelu, Sue Farr, Mick McDaid and Geoff Tann. Finds were processed by Sue Farr and identified by Jane Young and Maggi Darling. The positions of finds and observations from the fieldwalking were plotted by Mick McDaid. The report was collated and produced by Jane Frost.

Geoff Tann
Lindsey Archaeological Services
14th December 1998

References

APS 1994 *A Watching Brief at Welland Bank Pit Phase 1, Deeping St. James*. Archaeological Project Services, March 1994.

APS 1995a *A Watching Brief at Welland Bank Pit Phase 2, Third Interim Statement*. Archaeological Project Services, January 1995.

APS 1995b *A Watching Brief at Welland Bank Pit Phase 2, Interim Statement*. Archaeological Project Services, February 1995.RCHM 1960 *A Matter of Time: an archaeological survey*. Royal Commission on Historical Monuments. London.

Casa, R. and Wood, M. 1997 *A Watching Brief on land NW of Wellington Way, Market Deeping*. PISA, November 1997.

Hayes, P.P. and Lane, T.W. 1992 *The Fenland Project 5: Lincolnshire Survey, The South-West Fens*.

Johnson, A. 1993 *Land at West Deeping, Lincs.: Magnetic Susceptibility Survey*. Oxford Archaeotechnics, November 1993.

LAO 2 Deeping Fen 1/5/1 *A map of Deeping Fen in the County of Lincoln – the sevearal Lands and Commons surveyed by Vincent Grant c. 1670 by J. Featherstone 1763*. Ms plan at Lincolnshire Archives.

LAO Kesteven Award 22 *Market Deeping Enclosure Schedule and Award*. Ms. at Lincolnshire Archives.

Mouraille, R. 1996 *Archaeological Investigations at Welland Bank Pit, Deeping St. James; Interim Report*. Archaeological Project Services, June 1996.

Mouraille, R., Lane, T., Trimble, D. and Taylor G. 1996 *Archaeological Evaluation of a Late Bronze Age – Early Iron Age Settlement on Sly Mason Fields, Welland Bank Quarry*. Archaeological Project Services, October 1996.

OS 1978 *Ordnance Survey 1:10,000 map*, Sheet TF 10 NE.

OS 1979 *Ordnance Survey 1:10,000 map*, Sheet TF 11 SW.

OS 1983 *Ordnance Survey 1:25,000 map*, Pathfinder Sheet TF 00/10.

OS 1986 *Ordnance Survey 1:25,000 map*, Pathfinder Sheet 877, TF 01/11.

OS 1988 *Ordnance Survey 1:50,000 map*, Landranger Sheet 142.

Purvis, J. 1993 *NRA Anglian Region: Market Deeping Defences – Environmental Appraisal Report*. Posford Duvivier, November 1993.

Simmons 1995 *Horsegate, Deeping St. James, Lincs.: Archaeological Watching Brief.* Pre-Construct Archaeology, January 1995.

Simpson, M. and Howland, A.F. 1998 *A Report on a Ground Investigation for Market Deeping Rising Mains (Factual).* Report by A.F. Howland Associates for Anglian Water Services, December 1998.

Taylor, G. 1997 "Deeping St. James: Welland Bank Quarry" in Field, N. and George, I "Archaeology in Lincolnshire 1997" *Lincolnshire History and Archaeology* 32, 45 – 59.

Archive Summary

Correspondence
Anglian Water Services' plans
Annotated copies of AWS plans
Archaeological finds: pottery, flint, tile
Specialists' archive lists and reports: Roman pottery, post-Roman pottery, clay tobacco pipe, tile

Appendix 1

Lincolnshire County Sites and Monuments Summary

30045 TF 1581 0948	SAM 22669	Medieval market cross, not in situ.
30047 TF 1695 0960	SAM 179	Prior's Meadow Roman site, identified 1965. Part of Roman ritual crown, much pottery including Samian ware. Ploughed 1966, soil marks and more pottery. Exceptionally large site on projected line of Roman River Welland. Partly scheduled.
33435 TF 1576 0962		Site of Benedictine Priory. Priory Farm probably built on site of buildings. Priory tithe barn extant until 1963. Partly excavated 1968 by Deepings Arch and Hist Society.
33436 TF 1329 1079	SAM 22668	Medieval cross base and modern shaft; socket stone below surface. Not in original position.
TF 1329 1079		Site of post-medieval toll bar.
33437 TF 1368 1030		St. Guthlac's Church. Fabric various dates from 13th century.
33438 TF 1368 1030		Anglo Saxon sculptural fragments: late-10th / 11th century grave cover and part of cross shaft, St. Guthlac's Church.
33439 TF 1372 1032		Possible site of priory. Fabric from 14th century.
33442 TF 1575 0959		St. James' Church. Fabric from 13th century.
33443 TF 1560 0965		Circular mound, flattened 1957. Possible prehistoric burial mound. No finds reported.
33444 TF 1571 0986		Site of post-medieval windmill, extant 1958.
33445 TF 1500 1032		Bronze Age cremation burial in urn within pit dug into gravel. Found 1898 in Linch Field. Also a human skull.
33447 TF 1540 1010		Neolithic polished stone axe (now a garden ornament).
33448 TF 1650 1010		Roman coin hoard found 1967. Coins up to AD 272.
33449 TF 1650 1010		Neolithic polished stone axe, leaf-shaped arrowhead, scraper and other flints.
33454 TF 1383 1089		Site of village pound. Extant 1958, lost by 1979.
33456 TF 1640 0990		Roman bronze ritual crown found in fragments.
33459 TF 1650 0960		Scatter of Mesolithic and Neolithic flints on slight rise.
33460 TF 1570 0960		16th century coin hoard.
33463 TF 1650 1020		Roman coin hoard, two pots. 3rd century. Found 1980.
34023 TF 13782 10027		Victorian almshouses.
34043 TF 1587 1154		Large Middle Iron Age and Roman mounded site thought to continue under road and into adjacent fields. Partly excavated 1991.
34044 TF 1587 1154		

34045	TF 1605 1159		Neolithic, Bronze Age and Iron Age flint and pottery scatter.
34054	TF 1511 1097		Substantial Romano-British finds scatter and soil mark extending to SE. Pottery, rubble, tile, burnt stone, quern, possible glass.Part of 34055.
34055	TF 1527 1108		Two concentrations of Romano-British pottery and other finds within extensive scatter. Soilmark. Part of 34054.
34056	TF 1521 1135		Romano-British pottery scatter, some animal bone, 1 flint. Some rubble.
34057	TF 1723 1112		
34058	TF 1728 1114		
34060	TF 1700 1063		Major Iron Age site, with prominent mound, dark soilmark, few flints, little Late Iron Age pottery but much Romano-British pottery.
34061	TF 1708 1053		Romano-British pottery scatter, no soilmark. Also quern, fired clay, slag, glass and shell. See 34070.
34062	TF 1708 1053		Handmade Iron Age pottery. See 34061.
34063	TF 1684 1071		Scatter of Romano-British pottery. No soil mark.
34064	TF 1696 1087		Late Bronze Age pottery scatter, few flints; some Roman pottery.
34066	TF 1628 1144	SAM 20811	Iron Age settlement site with prominent mound, under grass. Iron Age pottery on exposed ground. Earthwork features of a saltern beside the mound.
34067	TF 1628 1144	SAM 20811	Romano-British settlement site with prominent mound, under grass. Iron Age pottery on exposed ground. Earthwork features of a saltern beside the mound.
34070	TF 1790 0941		Romano-British pottery scatter and faint soil mark. Cut by backfilled dyke. Aps show large rectangular enclosure.
34073	TF 1730 1030		Romano-British pottery scatter, quern, burnt clay, brick. 2nd - 4th century pottery.
34074	TF 1600 0960		Late Iron Age gold coin found 1933.
34695	TF 1420 1130		Large concentration of Romano-British metalwork, especially brooches, of 1st century date found by metal detector users.
34753	TF 1347 1166		Roman Car Dyke canal earthwork.
34758	TF 1487 1216		Cropmark of circular ditch, perhaps modern.
34759	TF 1485 1250		Undated cropmarks of field boundary ditches. Complex may extend to east.
34760	TF 1520 1260		Undated cropmarks of large ditched enclosure.
34761	TF 1555 1265		Undated cropmarks of field boundary ditches, enclosures and large pit.
34852	TF 1580 0948		Medieval pottery, 12th - 15th century found in pipe trench.
34853	TF 1580 0948		Post-medieval pottery. See 34852.
34923	TF 1810 0790		Prehistoric remains, Welland Bank Pit.
34961	TF 1390 1110		RAF Langtoft: site of radar station and pill box (WWII). Destroyed 1950s.
34978	TF 1850 0811		Prehistoric remains, Welland Bank Pit.

Appendix 2

Post-Roman Pottery Archive List

by Jane Young (City of Lincoln Archaeology Unit)

POST-ROMAN POTTERY ARCHIVE: MDM98 WARE TYPES BY FINDSPOT

Context	Ware	Sherds	Form	Comments
3b	LERTH	1	?	RIM?;18-20TH;WORN
3c	BOU	1	JUG	15-17TH;WORN
3d	LERTH	1	-	BASE;19/20TH
3f	GRE	1	JAR?	SIDE HANDLE;16-18TH
3g	BL	1	BOWL	RIM;18-19TH;WORN
4a	LERTH	1	-	19-20TH
4b	MEDLOC	1	JUG	BS;13-15TH;WORN
4b	GRE	1	?	SCRAP;16-18TH;WORN
4e	BL	1	BOWL	RIM;18TH
5a	GRE	1	BOWL	BS;16-18TH
5b	SLIP	1	-	WELL WORN NO SURFS;BS;17-18TH
5b	LERTH	1	-	WELL WORN NO SURFS;BS;17-18TH
5b	LERTH	1	BOWL	BS;18TH
5d	BOU	1	-	TINY;VERY WORN;15-17
5d	MEDLOC	1	BOWL?	RIM;VERY WORN;13-15
5e	BOU	1	JUG?	WORN;15-17
5f	BOU	1	JAR	RIM;WORN;16-18
5g	GRE	1	JAR?	GRITTY FABRIC;WORN;16-18TH
5h	BOU	1	JAR	RIM;WORN;15-17
5j	MEDLOC	1	JUG	BS;WELL WORN;13-14
7a	GRE	1	JAR?	BS;16-18TH
7c	BOU	1	?	BS;15-17TH;VERY WORN
7c	RGRE	1	BOWL?	BASE;ODD RED GLZE? INT;16-17TH
7e	MEDLOC	1	-	WELL WORN;13-15TH
8a	STSL	1	-	WELL WORN;18TH
8c	R	1	-	-
8d	MEDLOC	1	-	WORN;13-15TH
14b	R	1	-	-
14b	BL	1	-	TINY;17/18TH
14c	R	9	-	-
14d	R	6	-	-
15b	BL	1	JUG	BASE;L17/18
15b	R	1	-	-
16a	LSTON	1	-	19/20
16a	BS	1	-	18-20TH
16c	LERTH	1	-	18-19TH
16c	GRE	1	-	16-18TH
16d	BL	1	BOWL	RIM;18-19TH
18a	MISC	1	-	MAGGI TO CHECK FOR ROMAN
21c	BL	1	BOWL	RIM;18TH
24b	GRE	1	JAR;STORAGE	RIM;17-18TH
24b	GRE	1	JAR	RIM;16-18TH
24b	LERTH	1	?	BS;16-19TH
24b	MEDLOC	1	?	VERY WORN;BS;13-15TH
24c	SLIP	1	DISH	WORN;BS;L16-18TH
24d	LERTH	1	BOWL	18-19TH
24e	RGRE	1	BOWL?	BS;16-17TH
24f	BS	1	-	BASE;18-20TH
24g	BOU	1	JUG?	BASE;WELL WORN;15-17TH

24j	LERTH	1	-	BS;18TH
24k	SLIP	1	BOWL	BS;L17-18TH
24l	R	1	-	-
24m	SLIP	1	-	18TH
25b	GRE	1	-	17-18TH
34a	BOU	1	JAR?	WORN;15-17TH
34b	MEDLOC	1	-	VERY WORN;13-15TH
34c	MEDLOC	1	-	VERY WORN;13-15TH
34c	BOU	1	JAR/JUG	BS;15-17TH
34d	TB	1	-	BASE;15-17TH
34e	BOU	1	JUG	HANDLE;15-17TH
34f	BOU	1	JUG	LHJ;15-17TH
34f	GRE	1	?	BS;16-18TH
34g	GRE	2	?	BS;16-18TH
34h	R	1	-	-
34k	R	2	-	-
34l	BOU	1	JUG	BS;15-17TH
34n	R	1	-	-
34n	BOUA	1	-	VERY WORN;13-14TH
34p	R	1	-	-
34q	MISC	1	-	HANDMADE QUARTZ + SHELL FABRIC; MAGGI TO CHECK
34r	DST	1	JUG	BASE;M12-M13TH
34s	TB	1	BOWL?	BS;16-17TH
34s	MEDLOC	1	-	TINY;13-15TH
34s	STANLY	1	-	SHELL FABRIC;12-14TH;? ID
34s	MEDLOC	1	JUG	UHJ;STABBED STRAP HANDLE; 12-14TH
34s	R	4	-	-
34t	R	1	-	-
34u	R	2	-	-
34w	R	2	-	-
34x	R	3	-	-
35a	R	4	-	-
35a	MEDLOC	1	-	WELL WORN;13-15TH
35b	R	6	-	-
35c	R	1	-	-
35c	BL	1	-	BASE;17-18TH
35d	GRE	1	JAR	RIM;16-18TH
35d	MEDLOC	1	JUG?	BASE;13-15TH
35d	R	1	-	-
35e	R	1	-	-
35g	R	1	-	-
35g	BL	1	-	17/18TH
35g	MEDLOC	1	-	WORN;13-15TH
35h	R	1	-	-
35j	R	1	-	-
35j	BOU	1	JUG/JAR	BS;15-17TH
35j	MEDLOC	1	BOWL/CURFEW	RIM;INT SOOT; 13-14TH
35k	MEDLOC	1	-	VERY WORN;13-15TH
35k	BL	1	BOWL	L17-18TH
37a	STMO	1	MUG?	L17-18TH

37b	BOU	1	JUG/JAR	WORN;15-17TH
37b	BOU	1	JUG/JAR	WORN;15-17TH
37c	BL	1	-	TINY;17-18TH
37d	GRE	1	JAR	RIM;17-18TH
37e	BOU	1	JAR/JUG	BS;15-17TH
37f	MEDLOC	1	JUG	WORN;13-15TH
37g	MISC	1	-	OK FOR MEDLOC BUT MAGGI TO CHECK
37g	BOU	1	DISH	RIM;ODD VERY FRESH LARGE FRAG WITH FRESH BREAKS;16-17TH
37h	BOU	1	JAR/JUG	WORN;15-17TH
37h	BOU	1	JAR/JUG	WORN;15-17TH
37j	BOU	1	JAR/JUG	WORN;15-17TH
39a	BOU	1	JAR/JUG	WORN;15-17TH
39b	BOU	1	JAR/JUG	WORN;15-17TH
40a	BL	1	BOWL	18-19TH
40b	BOU	1	JAR/JUG	WORN;15-17TH
40c	BOU	1	JAR/JUG	WORN;15-17TH
41a	BL	1	BOWL	RIM;18-19TH
41a	STSL	1	-	L17-18TH
41a	TB	1	JUG/CISTERN	HANDLE;16-18TH
41b	BOU	1	JAR/JUG	BS;15-17TH
41b	BOUA	1	BOWL	RIM;13-14TH
41b	BOUA	1	-	? ID;BS;13-14TH
41c	MEDLOC	1	-	VERY WORN;13-15TH
41d	MEDLOC	1	-	? ID;VERY WORN;13-15TH

Glossary of Post-Roman Pottery Codes

Berth	Brown earthenwares: mid 16th/early 19th centuries
Bl	Blackware: mid 16th - modern
Bou	Bourne Fabric D: mid 15th - mid 17th centuries
Boua	Bourne fabrics A-C: mid 12th - late 14th centuries
Bs	Brown stoneware: late 17th century - modern
Dst	developed Stamford ware: early 12th - mid 13th centuries
Gre	glazed red earthenwares: mid 16th/late 18th centuries
Lerth	late earthenwares: mid 18th/20th centuries
Lston	late stonewares: late 18th/20th centuries
Medloc	medieval, local origin: early 13th/late 15th centuries
Misc	undated wares
R	Roman
Rgre	reduced glazed red earthenwares: mid 16th/late 18th centuries
Slip	slipwares: early 17th/20th centuries
Stanly	Stanion/ Lyveden type wares: early 13th – late 14th centuries
Stmo	Staffordshire mottled ware: mid 17th - mid 18th centuries
Stsl	Staffordshire slipware: mid 17th - mid 18th centuries
TB	Toynton All Saints/ Bolingbroke kilns: mid 15th/mid 18th centuries

Clay Tobacco Pipes Archive List

by Jen Mann (City of Lincoln Archaeology Unit)

MARKET DEEPING RISING MAINS: MDM98

FINDS LIST

Finds No	Material	Object	Comments
8b	CERA	PIPE	PMED;M17-18;PROB M/L17C ABRA
21a	CERA	PIPE	PMED;M17-L17;PART BOWL PROB M17C
24j	CERA	PIPE	PMED;L17-L18;PROB 18C
25a	CERA	PIPE	PMED-MOD;E18-19;PROB L18/19C
34r	CERA	PIPE	PMED;E17-E18;PROB E/M17C

Report on the Roman Pottery

by Maggi Darling

by Margaret J. Darling, M.Phil., F.S.A., M.I.F.A.

10 December 1998

QUANTITY AND CONDITION

The total quantity recorded was 58 sherds from 26 contexts. Most of the sherds showed abrasion to varying degrees; few were fresh. No problems are anticipated for long term storage. The pottery has been archived according to the guidelines of *The Study Group for Roman Pottery*, the archive including sherd count; weight was not recorded due to the fragmentary nature of the pottery. A copy of the archive database is attached (Appendix 1). Vessels suitable for illustration have been noted in the database, but have not been separated. There was no specialist pottery as mortaria, samian and amphorae.

Table 1 Summary of quantities and dating by context

Cxt	Sherds	Date
8C	1	ROM
14B	3	M2+
14C	10	ML3
14D	6	EM3?
15B	1	POSTRO
18A	1	POSTRO
24L	1	POSTRO
34H	1	M2+
34K	2	3C?
34N	1	ROM/POSTRO
34P	1	ROM
34Q	1	ROM
34S	4	ML2+
34T	1	M2+
34U	2	M3+
34W	2	M2+
34X	3	M3+
35A	4	M2+
35B	6	M2+
35C	1	ROM
35D	1	ML3
35E	1	ROM
35G	1	ML3
35H	1	M2+
35J	1	ML3
37G	1	POSTRO
Total	58	

No definite sherd links were noted.

OVERVIEW OF FABRICS

The fabrics represented are shown on Table 2

Table 2 Fabrics, quantities

Fabric	Code	Shs	%
Black-Burnished ware 1	BB1	1	1.72
Grey	GREY	16	27.59
Nene Valley colour-coated	NVCC	6	10.34
Nene Valley grey colour-coated	NVGCC?	4	6.90
Nene Valley grey ware	NVGW	17	29.31
Nene Valley grey ware	NVGW?	3	5.17
Oxidized	OX	3	5.17
Post-Roman	PRO	4	6.89
Shell-gritted	SHEL	4	6.90
Total		58	100

The content of fabrics is as can be anticipated from this site, relatively close to the Nene Valley and receiving coarser wares (34.5%) in addition to fine wares (17.2%) which, with the addition of the shell-gritted, probably the RSG jars normally seen in the area, totals 58.6% of this small assemblage (63% excluding the post-Roman sherds). Some of the grey sherds may also be from the Nene Valley area. The unusual inclusion is the BB1 vessel, a plain-rimmed dish, probably of early-mid 3rd century date. Finds of these Dorset vessels are rare in this area.

DISCUSSION

There are no sherds indicative of a 1st-century date, and the earliest dating, broadly mid 2nd century and later, comes from body sherds of Nene Valley grey ware, which could continue until the early 4th century. The paucity of more diagnostic dating evidence can be gauged by the occurrence of only six vessels being represented by rim sherds, apart from the complete profile of the BB1 dish. The main dating therefore relies on a NVGCC bead-and-flange bowl and a rounded-rim bowl or dish, and colour-coated body sherds. These suggests the main range to be 3rd century, extending to the latter part of the 3rd century, but there is no evidence for any 4th-century pottery.

The only vessels worth illustrating are the BB1 plain-rimmed dish, and the two NVGCC bowls.

Cxt	Fabric	Form	Manuf+	Vess	D?	DNo	Details	Links	Shs
8C	SHEL	J	-	-	-	-	TINY RIM FRAG	-	1
8C	ZDATE	-	-	-	-	-	ROM	-	-
14B	NVGW	JB	-	-	-	-	FTRG BASE	-	1
14B	NVGW	-	-	-	-	-	BS ABR	-	1
14B	OX	JB	-	-	-	-	NECK FRAG W CORDON;LTRB;GRY FAB	-	1
14B	ZDATE	-	-	-	-	-	M2+	-	-
14C	NVCC	J?	-	-	-	-	CURVING NECK FRAG;CR FAB	-	1
14C	NVGCC?	BFBL	-	1	D?	-	J RIM/WALL SHS;ABR;GRY FAB	-	2
14C	NVGW	JB	-	-	-	-	BASE FRAG	-	1
14C	NVGW	BDFL	-	-	-	-	RIM/PT WALL;BURNT	-	1
14C	NVGW?	BK?	-	-	-	-	THIN WALL BS;ABR	-	1
14C	NVGW	JBK?	-	-	-	-	100% BASE;OFFSET U'SIDE	-	1
14C	GREY	-	-	-	-	-	CHIP	-	1
14C	SHEL	-	-	-	-	-	VABR BASE FR;SURF LOST INT	-	1
14C	SHEL	JS	RIL?	-	-	-	THICK BS	-	1
14C	ZDATE	-	-	-	-	-	ML3	-	-
14D	NVGCC?	BDRR	-	-	D?	-	RIM/PT WALL;GRY CORE FAB	-	1
14D	NVGW	DPR	-	-	-	-	RIM FR/PT WALL	-	1
14D	NVGW	-	-	-	-	-	BS	-	1
14D	GREY	-	-	-	-	-	BS NR NVGW	-	1
14D	GREY	J?	-	-	-	-	SHLDR/GROOVED & CORDON	-	1
14D	BB1	DPR	BIA	-	D	-	COMP PROF	-	1
14D	ZDATE	-	-	-	-	-	EM3?	-	-
15B	PRO	-	-	-	-	-	LTBN BS W CALC & TRACES GLAZE	-	1
15B	ZDATE	-	-	-	-	-	POSTRO	-	-
18A	PRO	-	-	-	-	-	HARSH SANDY BS;CRBN SURF	-	1
18A	ZDATE	-	-	-	-	-	POSTRO	-	-
24L	PRO	-	-	-	-	-	V SANDY THIN-WALL BS	-	1
24L	ZDATE	-	-	-	-	-	POSTRO	-	-
34H	NVGW	-	-	-	-	-	ABR BS	-	1
34H	ZDATE	-	-	-	-	-	M2+	-	-
34K	NVCC	B?	-	-	-	-	ABR BS;CR FAB	-	1
34K	OX	-	-	-	-	-	FLAKE ONLY;RB ON GRY ?ROM	-	1
34K	ZDATE	-	-	-	-	-	3C?	-	-
34N	GREY	JBK?	-	-	-	-	THIN WALL VESIC BS;OCC CALC	-	1
34N	ZDATE	-	-	-	-	-	ROM/POSTRO	-	-
34P	GREY	CLSD	-	-	-	-	BS;SAME FAB 34N	-	1
34P	ZDATE	-	-	-	-	-	ROM	-	-
34Q	SHEL	J	-	-	-	-	BS;RB EXT	-	1
34Q	ZDATE	-	-	-	-	-	ROM	-	-
34S	GREY	BDTR	-	-	-	-	RIM FRAG	-	1
34S	GREY	BK	-	1?	-	-	FTM BASE FRAG;BSS	-	3
34S	ZDATE	-	-	-	-	-	ML2+	-	-
34T	NVGW	-	-	-	-	-	ABR BS	-	1
34T	ZDATE	-	-	-	-	-	M2+	-	-
34U	NVGW	JB	-	-	-	-	BASE FRAG;ABR	-	1
34U	NVCC	BKROU?	ROUZ	-	-	-	BS;DKGRY CC EXT ONLY	-	1
34U	ZDATE	-	-	-	-	-	M3+	-	-
34W	NVGW	-	-	-	-	-	BS;FRESH	-	1
34W	GREY	-	-	-	-	-	BS DKGRY ON LTER FAB	-	1
34W	ZDATE	-	-	-	-	-	M2+	-	-
34X	NVCC	BD?	-	-	-	-	VABR BS;CR FAB	-	1
34X	NVGW?	CLSD	-	-	-	-	BS;GRYISH INT COAT?	-	1
34X	GREY	BK?	-	-	-	-	THIN WALL DKGRY SURF BS	-	1
34X	ZDATE	-	-	-	-	-	M3+	-	-
35A	NVGW?	JBEV	-	-	-	-	RIM/SHLDR FR	-	1
35A	NVGW	-	-	-	-	-	ABR BSS	-	3

Cxt	Fabric	Form	Manuf+	Vess	D?	DNo	Details	Links	Shs
35A	ZDATE	-	-	-	-	-	M2+	-	-
35D	NVCC?	BKFO	-	-	-	-	BS;LATE RB S.SANDY FAB	-	1
35D	ZDATE	-	-	-	-	-	ML3	-	-
35B	NVGW	-	-	-	-	-	BSS	-	2
35B	GREY	JL?	-	-	-	-	THICK BS	-	1
35B	GREY	-	-	-	-	-	BSS	-	2
35B	OX?	-	-	-	-	-	BURNT BS	-	1
35B	ZDATE	-	-	-	-	-	M2+	-	-
35C	GREY	-	-	-	-	-	BS	-	1
35C	ZDATE	-	-	-	-	-	ROM	-	-
35E	GREY	-	-	-	-	-	COARSER FAB BS	-	1
35E	ZDATE	-	-	-	-	-	ROM	-	-
35H	NVGW	CLSD	-	-	-	-	THINNISH WALL BS	-	1
35H	ZDATE	-	-	-	-	-	M2+	-	-
35G	NVGCC?	B	-	-	-	-	LWR WALL;BASE FR;ABR;CR-GRY FAB	-	1
35G	ZDATE	-	-	-	-	-	ML3	-	-
35J	NVCC	BK	-	-	-	-	BS LTRB FAB	-	1
35J	ZDATE	-	-	-	-	-	ML3	-	-
37G	PRO?	-	-	-	-	-	BURNT BASE FR;CRBN INT;SANDY HARD	-	1
37G	ZDATE	-	-	-	-	-	POSTRO	-	-

Appendix 5

Roman and Post-Roman Tile Archive List

by Jane Young (City of Lincoln Archaeology Unit)

TILE ARCHIVE: MDM98 TYPES BY FINDSPOT

Context	Type	Sherds	Comments
3A	PNR	1	FLAT;PMED+
3B	BRK	1	18TH+
3E	PNR	1	FLAT;PMED+
4B	PNR	1	FLAT;PMED+
4C	?	1	STONE ?;EDGED
4D	PNR	1	PMED
4D	PNR	1	MED/PMED
4F	FIRE	1	? ID OR STONE;FINE QUARTZ + FE
5A	PNR	1	FLAT;MED?
5A	PNR	1	ROM?
5B	PNR	1	CORNER;FLAT;BUFF FABRIC;PMED+
5B	BRK	1	18TH+
5B	STILE	1	MORTAR;LIMESTONE?
5B	PNR	1	PANT?;PMED
5C	PNR	1	PMED/ROM
5D	PNR	1	PMED/EMOD
5F	BRK	1	HANDMADE;17TH+
7D	FLOOR	1	PMED?;UNGLZE
8E	PNR	1	SHELL IN FABRIC;ROM-PMED
14A	RTIL	1	? ID;OR PMED
14C	RTIL	1	TEG?
20A	PNR	1	FLAT;PMED OR ROM
21A	PANT	1	18TH+
21B	PNR	1	IMBRX OR RIDGE;ROM OR PMED
24A	PNR	1	EMOD?
24E	PNR	1	PMED/EMOD
24H	BRK	1	18TH+
24H	PNR	1	? DATE
34B	PNR	1	EMOD OR ROM
34C	PNR	1	MED OR ROM
34J	PNR	1	MED?
34K	PNR	1	FLAT;PMED OR ROM
34K	PNR	1	EMOD BRK OR ROM TILE
34M	PNR	1	MED
34M	GRID	1	BOURNE;13/14TH
34Q	RTIL	1	-
34Q	PNR	1	FINE WHITE FABRIC POSS ROM
35B	PANT	1	18TH+
35F	PNR	1	FLAT/LARGE VESS;LMED/PMED
40A	PNR	1	SCRAP

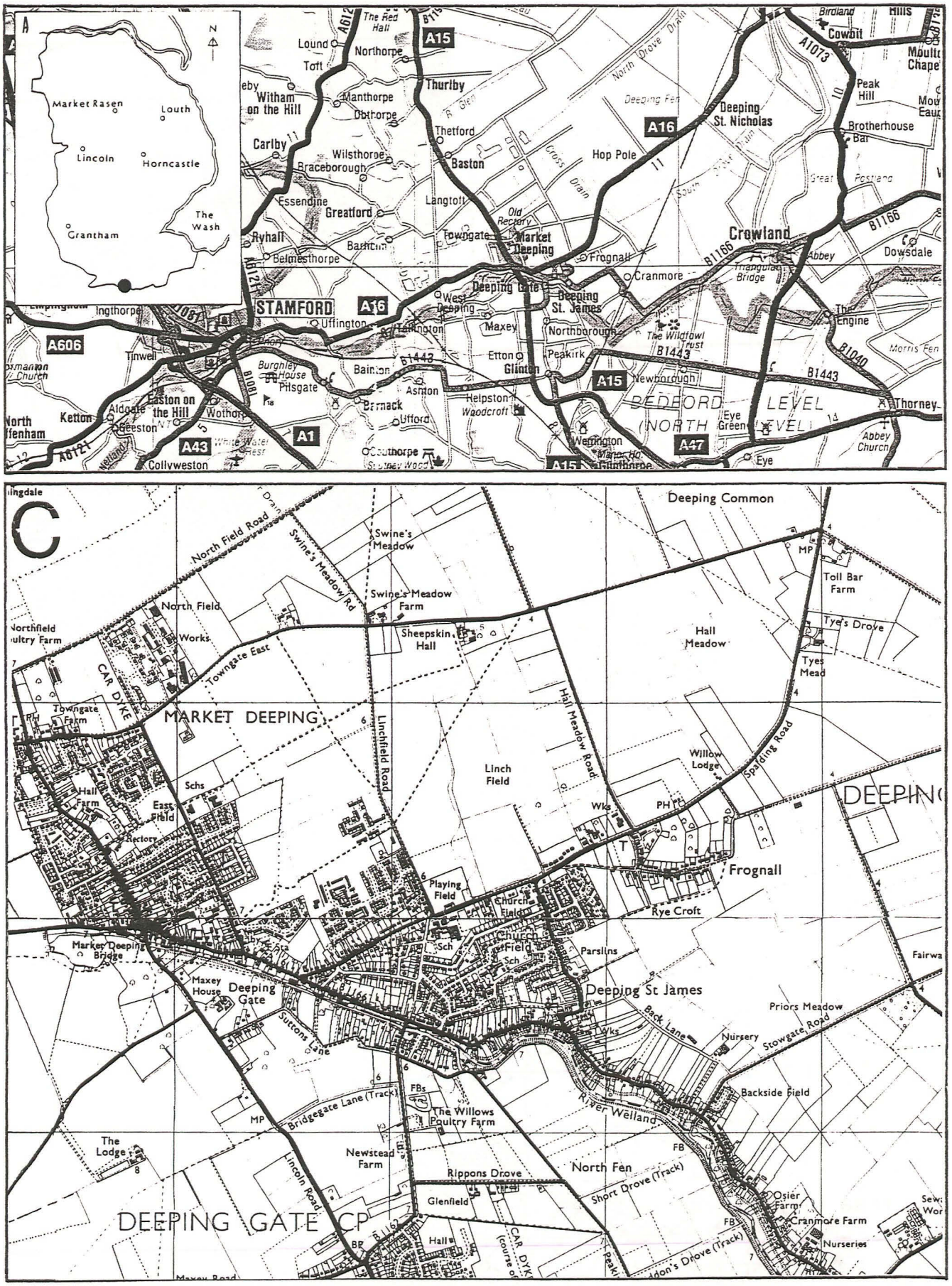


Fig. 1 Location of Market Deeping and Deeping St. James (inset C based on the 1983 and 1986 Ordnance Survey 1:25,000 maps, Pathfinder Sheets TF 00/10 and TF 01/11. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A.

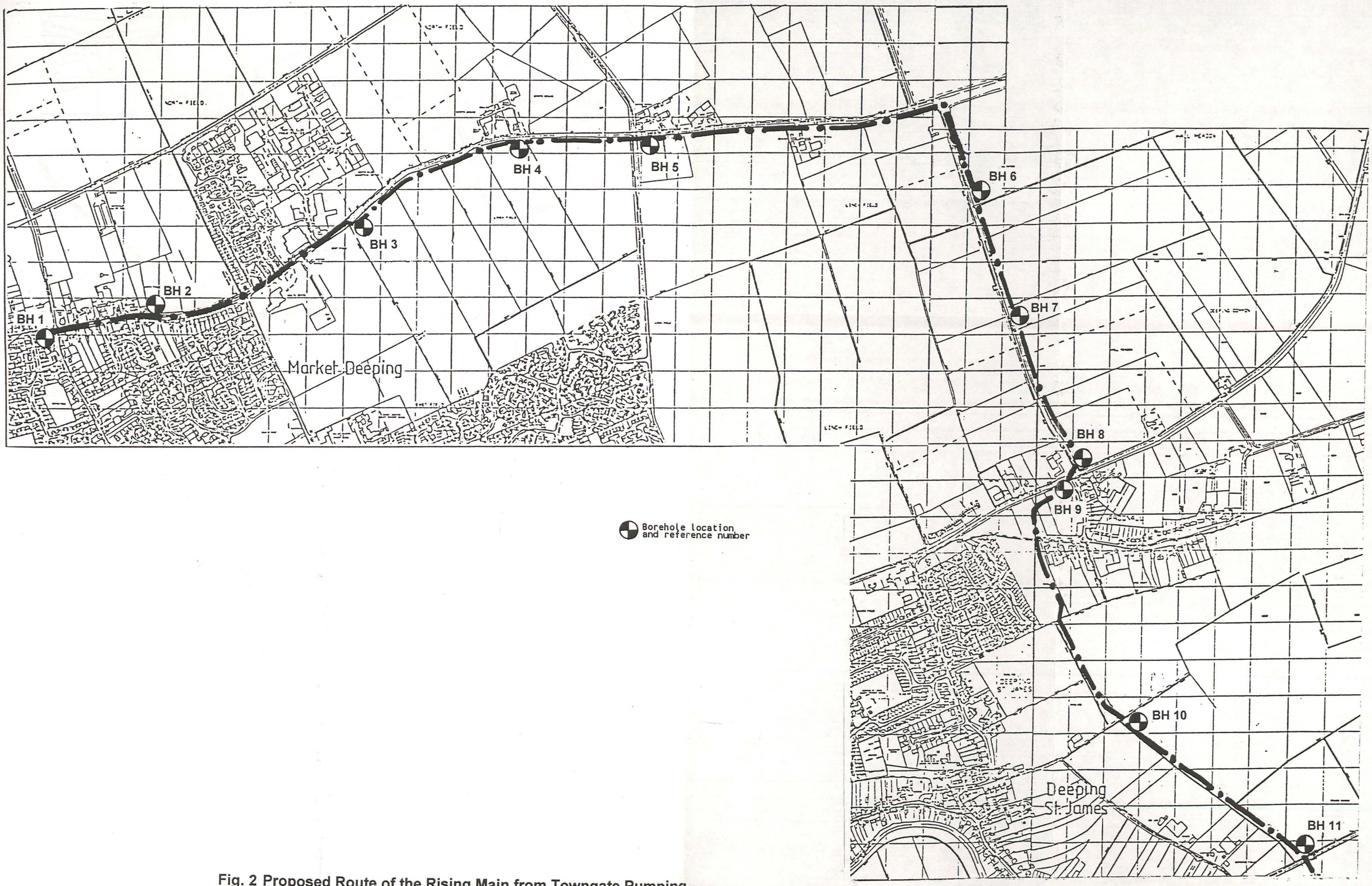


Fig. 2 Proposed Route of the Rising Main from Towngate Pumping Station, Market Deeping to Stowgate Road, Deeping St. James. Positions of boreholes are indicated. (Based on a plan by A.F. Howland Associates. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

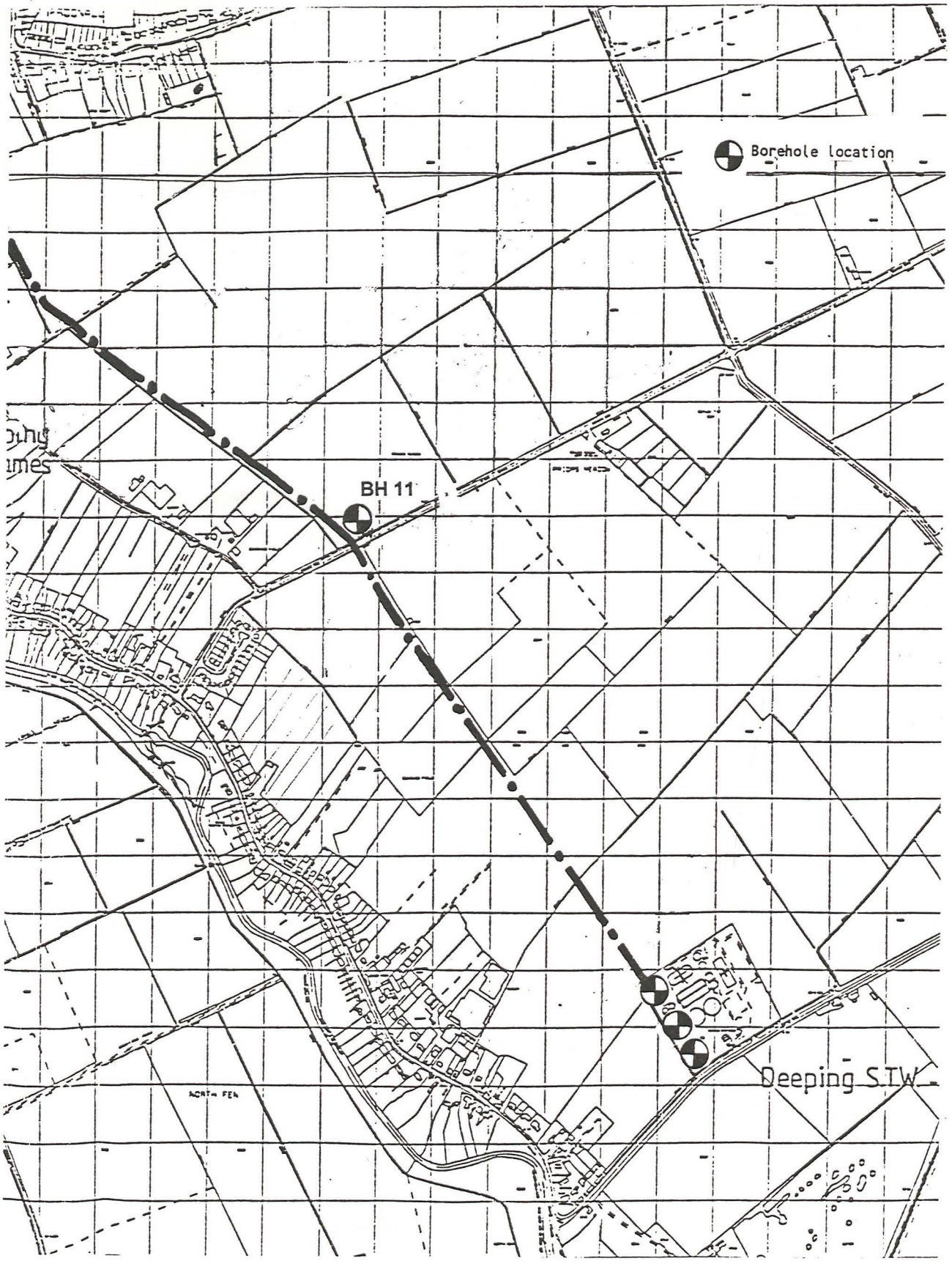


Fig. 3 Proposed Route of the Rising Main from Stowgate Road to Station Road STW, Deeping St. James. Positions of boreholes are indicated. (Based on a plan by A.F. Howland Associates. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

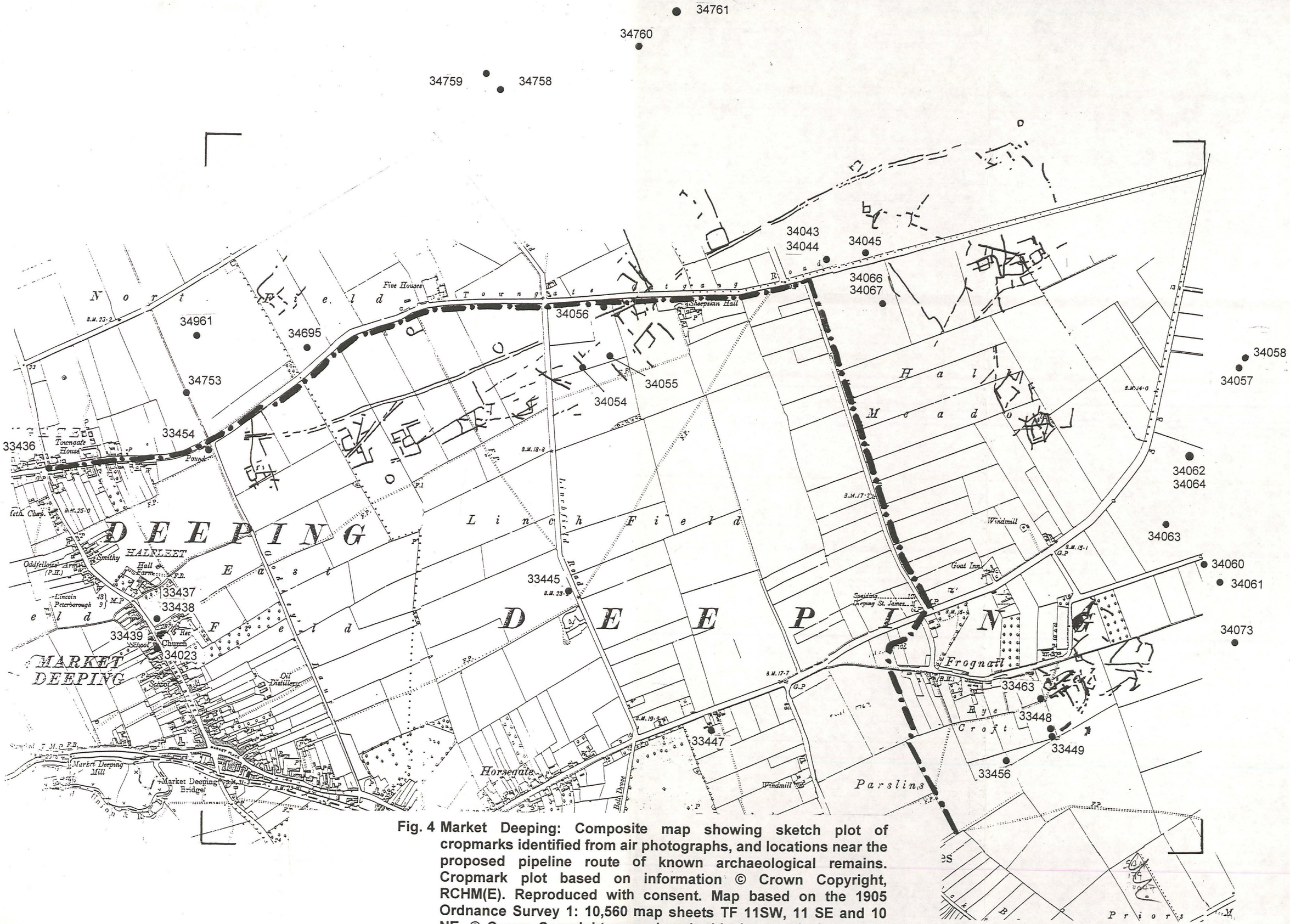


Fig. 4 Market Deeping: Composite map showing sketch plot of cropmarks identified from air photographs, and locations near the proposed pipeline route of known archaeological remains. Cropmark plot based on information © Crown Copyright, RCHM(E). Reproduced with consent. Map based on the 1905 Ordnance Survey 1: 10,560 map sheets TF 11SW, 11 SE and 10 NE. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

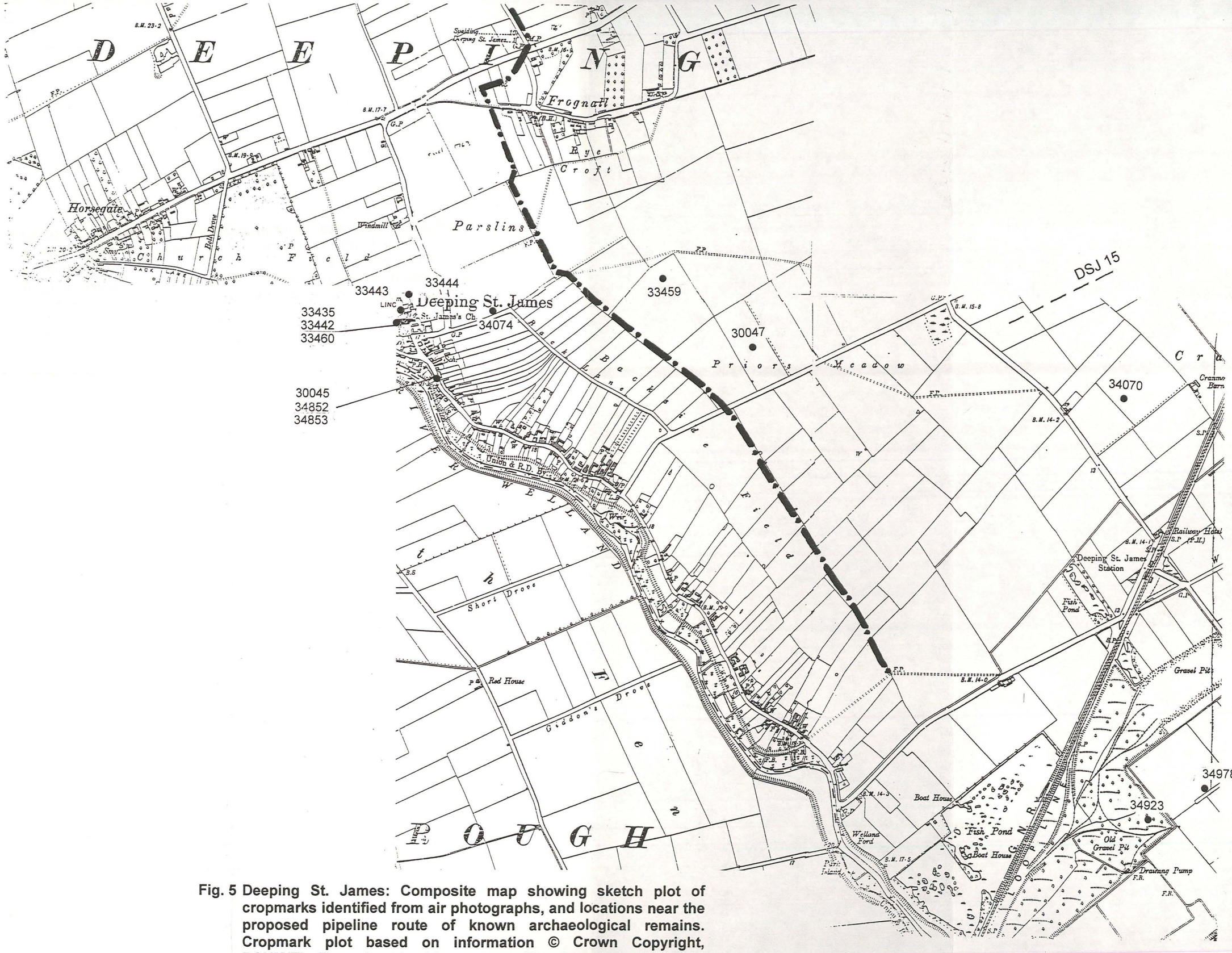


Fig. 5 Deeping St. James: Composite map showing sketch plot of cropmarks identified from air photographs, and locations near the proposed pipeline route of known archaeological remains. Cropmark plot based on information © Crown Copyright, RCHM(E). Reproduced with consent. Map based on the 1905 Ordnance Survey 1: 10,560 map sheets TF 11SW, 11 SE and 10 NE. © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

Fig. 6 Location of Prehistoric and Roman finds from the Fieldwalking Survey along the proposed pipeline route. Field numbers as assigned by LAS. Based on the 1: 2,500 plan supplied by Anglian Water Services Ltd; © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A)

a) Fields 1-7
b) Fields 8-17
c) Fields 18-31
d) Fields 32-38
e) Fields 39-41

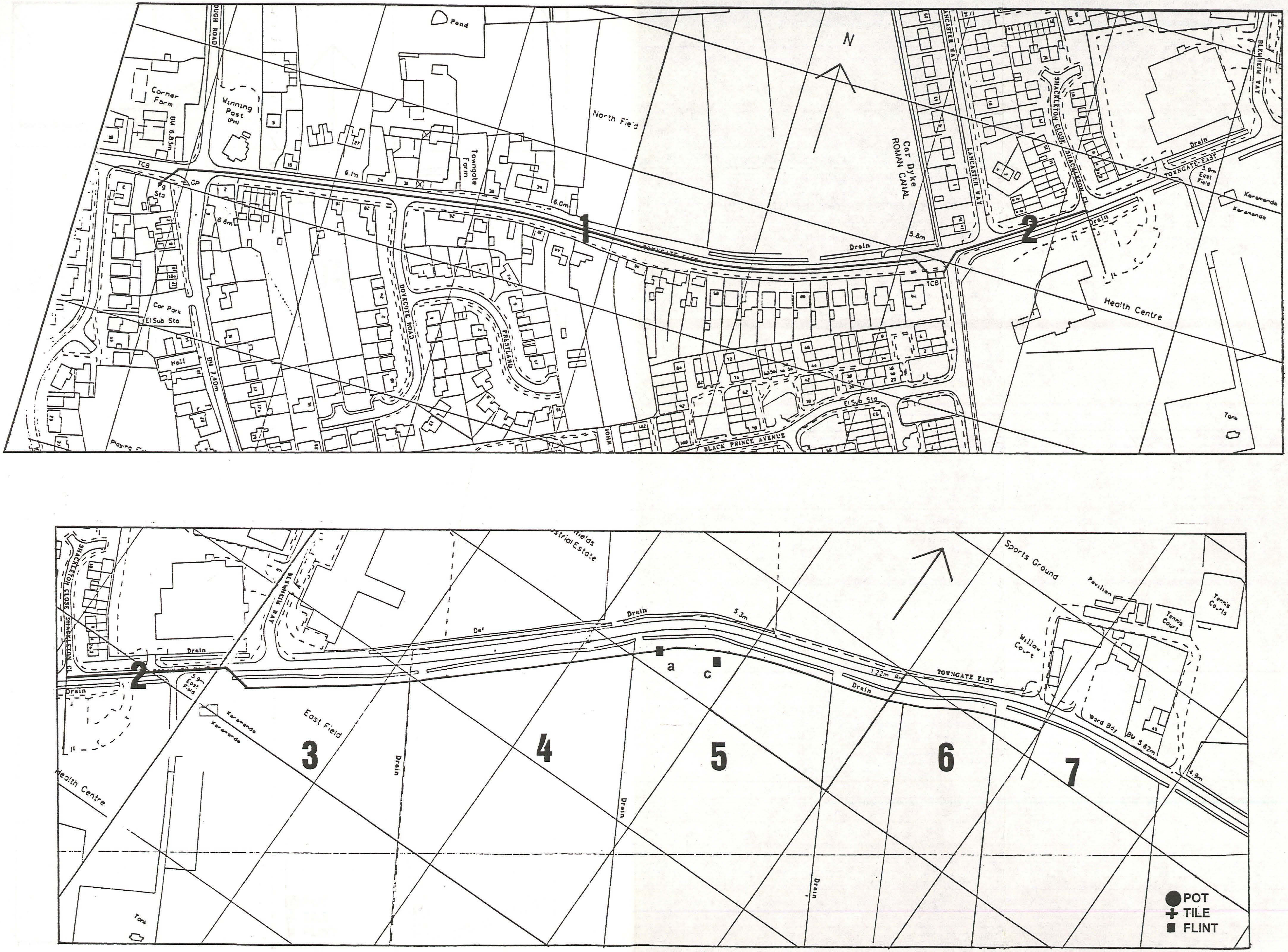
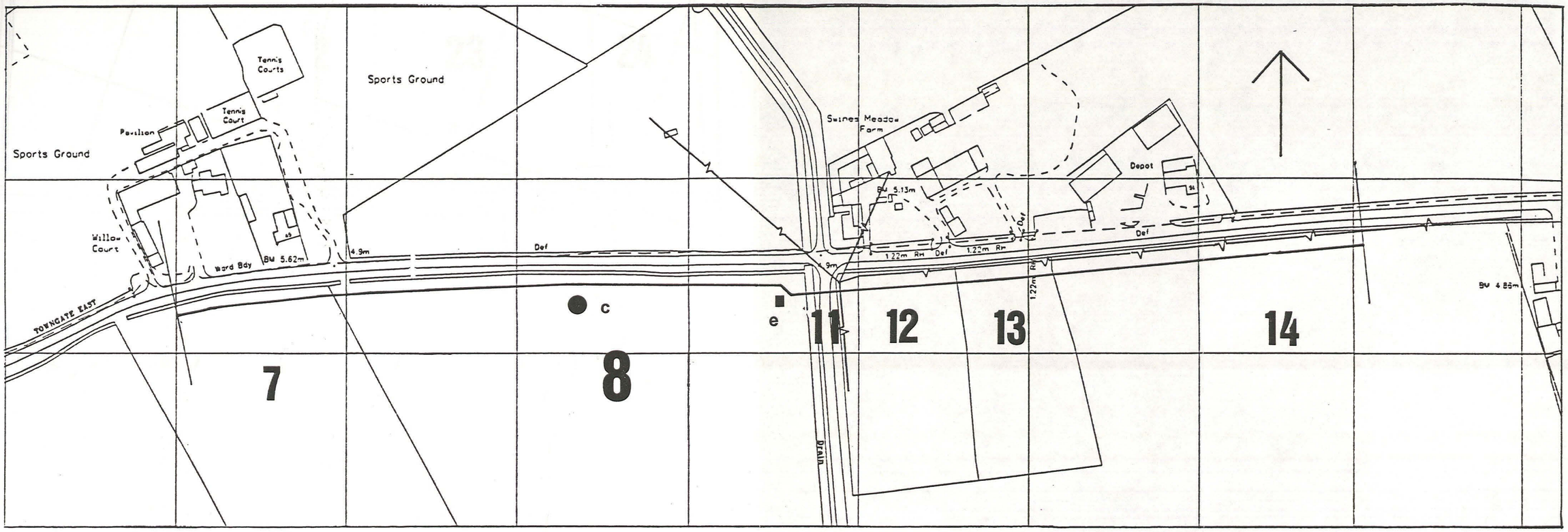

Pond
Corner Farm
Winning Post (PH)
North Field
Towngate Farm
Car Dyke ROMAN CANAL
LANCASTER WAY
SHACKLETON CLOSE
BLENHEIM WAY
DOVECOTE ROAD
PRESTLAND
BLACK PRINCE AVENUE
Car Park
El Sub Sta
Hall
Health Centre
East Field
Drain
TOWNGATE EAST
Karenando
Tank
TCB
N
1
2
3
4
5
6
7
a
c
Sports Ground
Pavilion
Tennis Courts
Tennis Court
Willow Court
Ward Bdy
POT
TILE
FLINT

Fig. 6a


Tennis Courts
Tennis Court
Pavilion
Sports Ground
Sports Ground
Willow Court
Ward Bdy
BM 5.62m
4.9m
Def
TOWNGATE EAST
Swines Meadow Farm
BM 5.13m
Depot
Def
1.22m Rm
Def
1.22m Rm
1.22m Rm
BM 4.85m
Drain
c
e
7
8
11
12
13
14

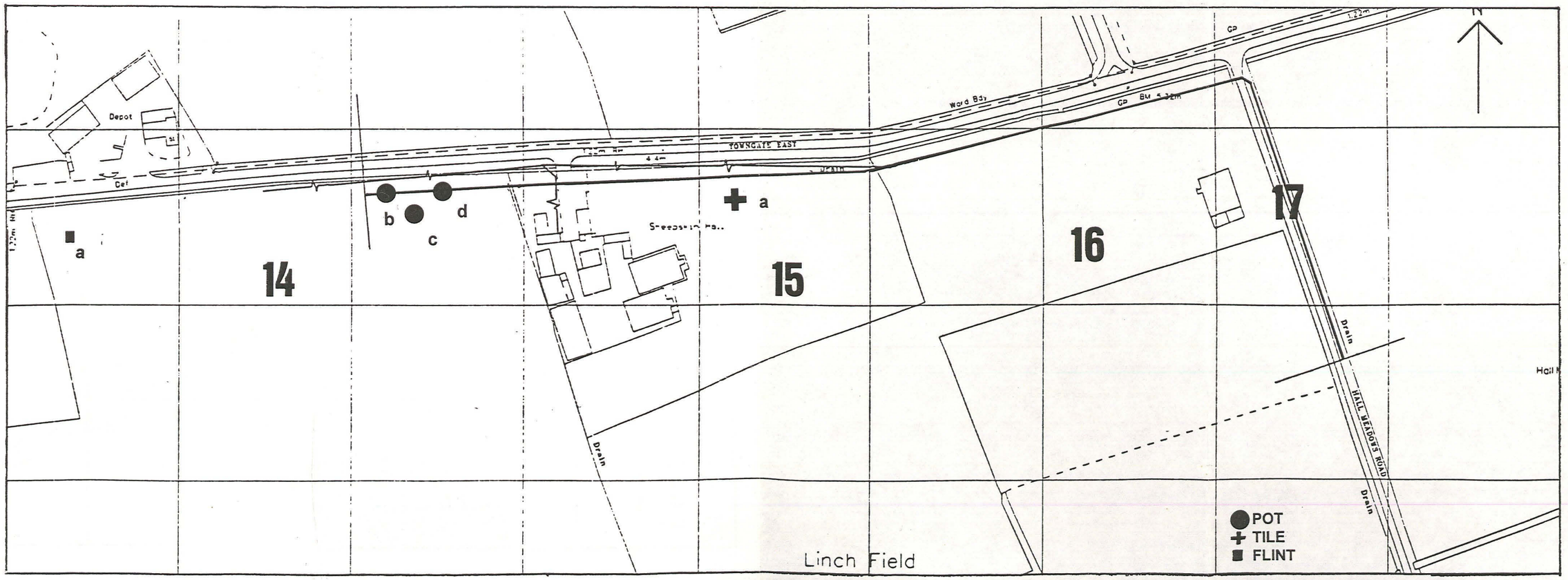
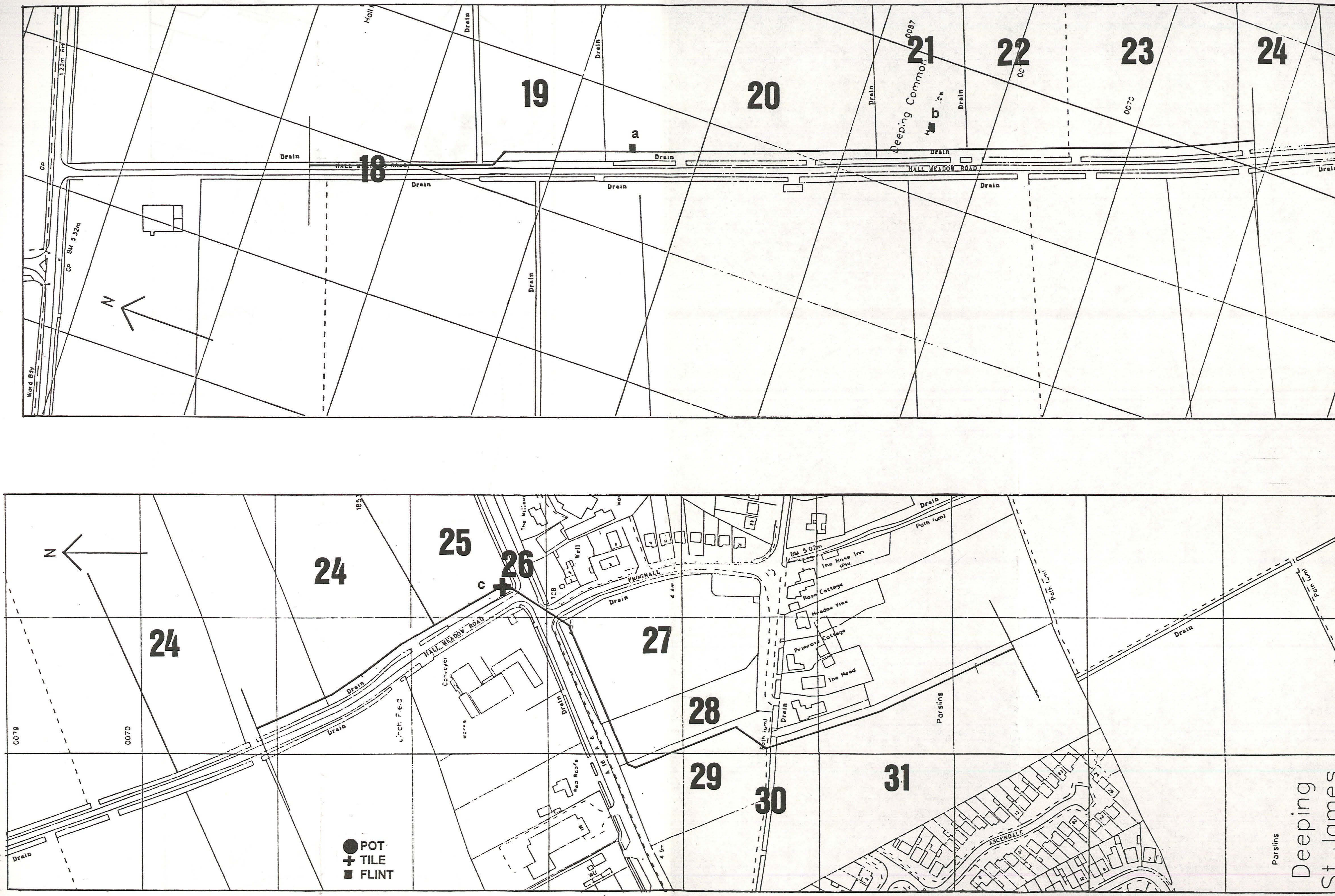
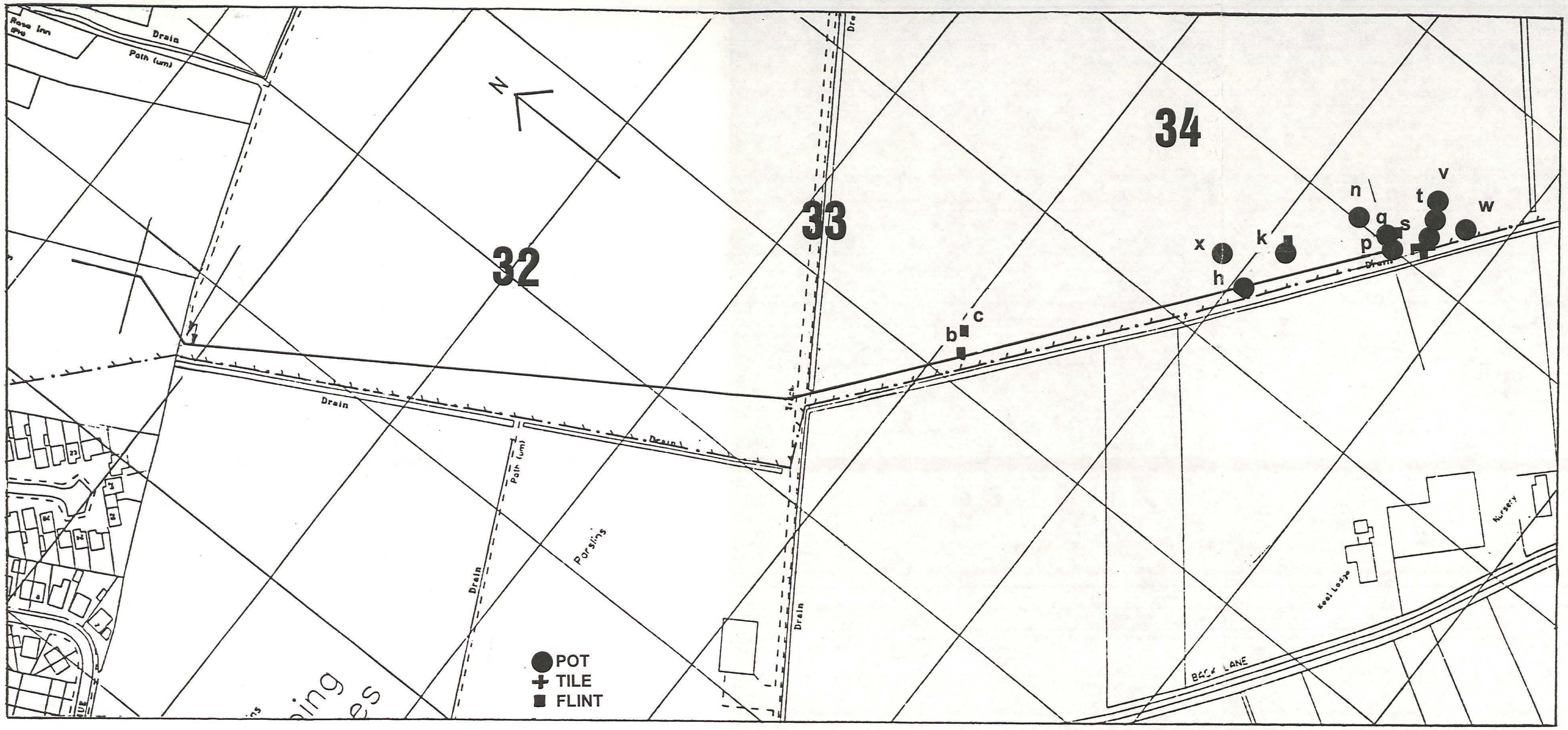

Depot
Def
TOWNGATE EAST
Ward Bdy
GP
GP
Drain
b
c
d
a
a
14
15
16
17
Drain
HALL MEADOWS ROAD
Drain
Linch Field
POT
TILE
FLINT

Fig. 6b



18
19
20
21
22
23
24
25
26
27
28
29
30
31
a
b
c
Drain
HALL MEADOW ROAD
Deeping Common
Ward Bdy
GP
BM 5.32m
1.22m RH
0087
0070
0079
N
FROGNALL
Conveyor
Linch Field
The Rose Inn (PH)
Rose Cottage
Meadow View
Primrose Cottage
The Mead
BM 5.02m
TCB
Well
A 16
Red Roofs
Path (um)
Parslins
ASCENDALE
POT
TILE
FLINT
Deeping
St James

Fig. 6c


32
33
34
POT
TILE
FLINT
Drain
Path (um)
Porslins
Back Lane
Nursery
b
c
h
x
k
n
q
s
p
t
v
w

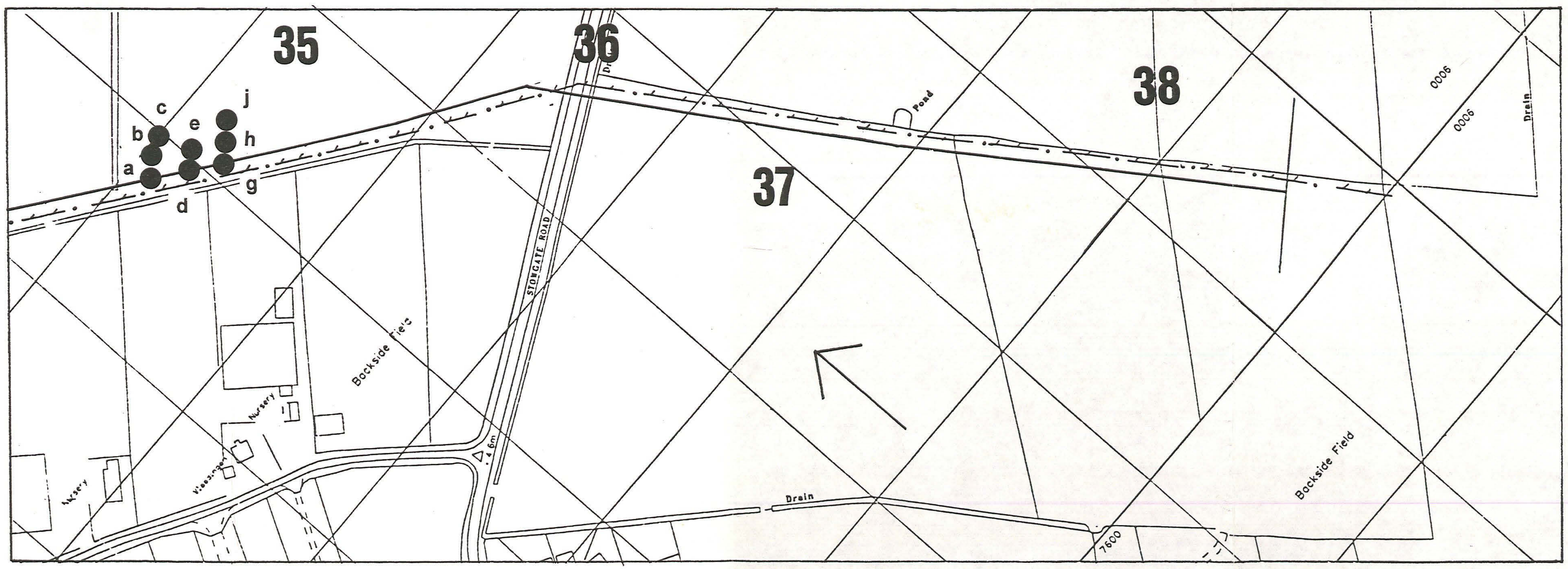

35
36
37
38
a
b
c
d
e
g
h
j
Pond
Stongate Road
Bockside Field
Nursery
Drain

Fig. 6d

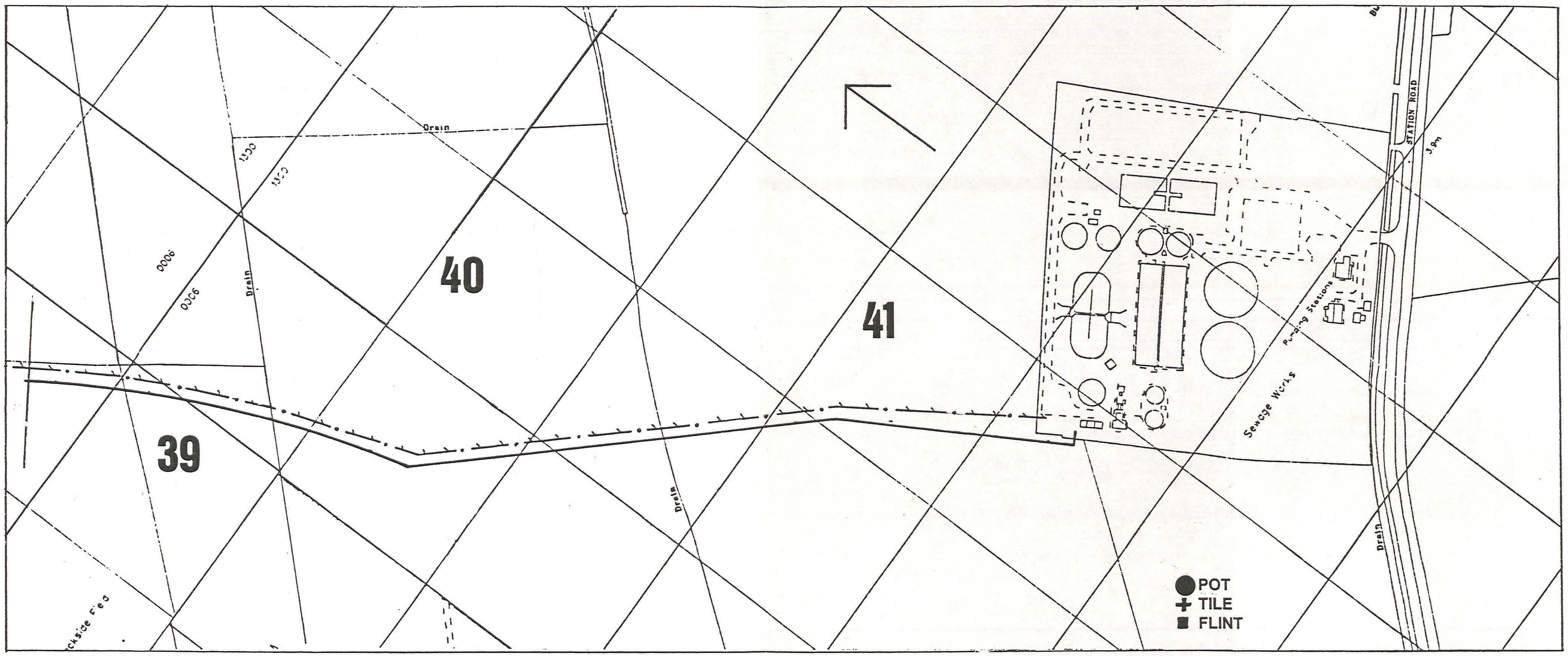

Drain
Drain
Drain
Drain
39
40
41
Sewage Works
Pumping Stations
STATION ROAD
POT
TILE
FLINT

Fig. 6e

Fig. 7 Location of Medieval and Post-medieval finds from the Fieldwalking Survey along the proposed pipeline route. Field numbers as assigned by LAS. Based on the 1: 2,500 plan supplied by Anglian Water Services Ltd; © Crown Copyright, reproduced with the permission of the Controller of HMSO. LAS Licence No. AL 50424A).

a) Fields 1-7
b) Fields 8-17
c) Fields 18-31
d) Fields 32-38
e) Fields 39-41

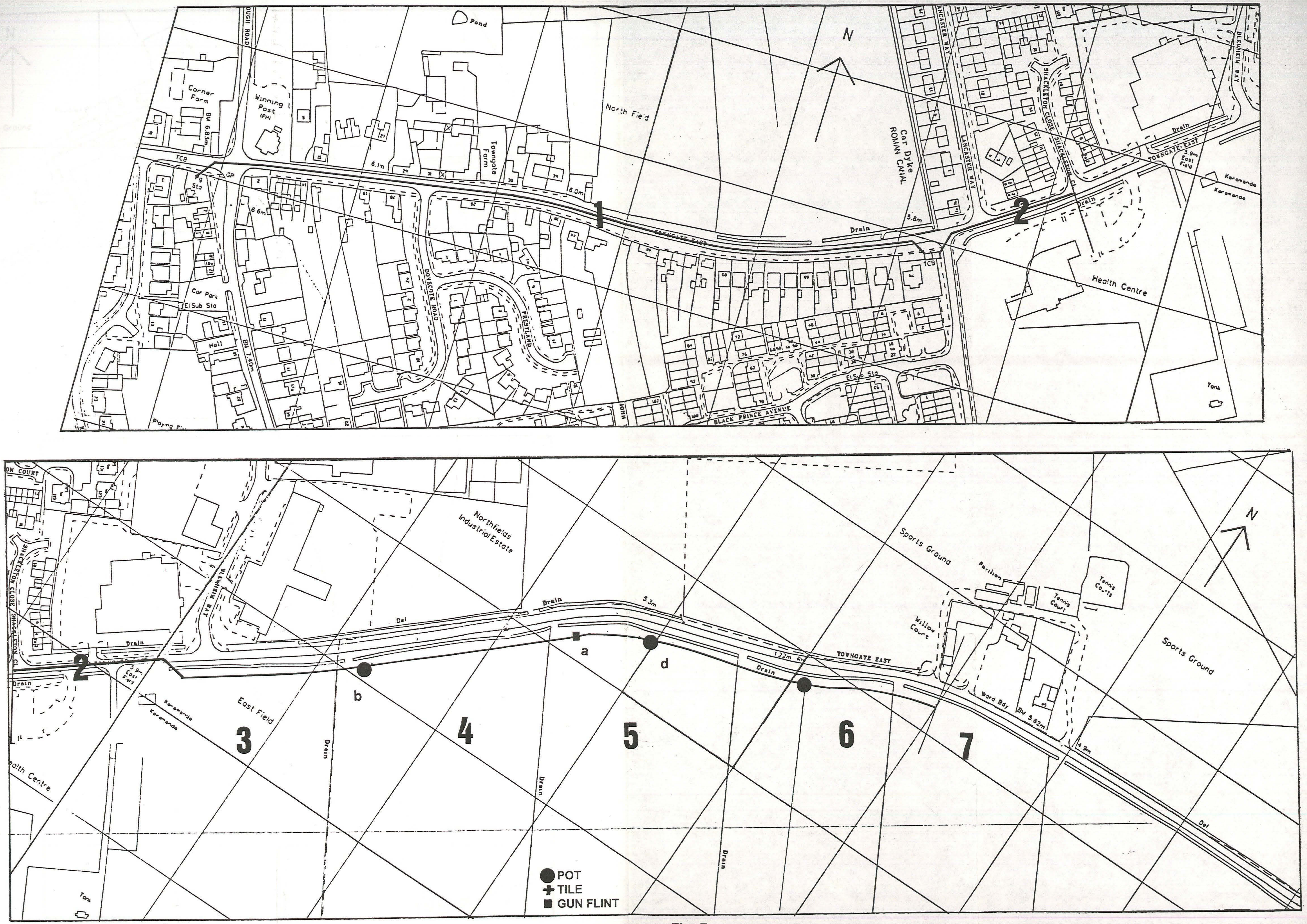

N
Pond
Corner Farm
Winning Post (PH)
North Field
Towngate Farm
Car Dyke
ROMAN CANAL
LANCASTER WAY
SHACKLETON CLOSE
BLENHEIM WAY
TOWNGATE EAST
Drain
Health Centre
Car Park
El Sub Sta
Hall
DOVECOTE ROAD
PRESTLAND
BLACK PRINCE AVENUE
Tank
1
2
Northfields Industrial Estate
East Field
Sports Ground
Pavilion
Tennis Courts
Willow Court
Ward Bdy
Def
a
b
d
3
4
5
6
7
POT
TILE
GUN FLINT

Fig. 7a

N

Sports Ground

Tennis Courts

Tennis Court

Pavilion

Sports Ground

Willow Court

Ward Bdy

BM 5.62m

4.9m

Def

TOWNGATE EAST

e

d

Swines Meadow Farm

BM 5.13m

Depot

Def

1.22m RH

4.4m

BM 4.85m

Sheepskin

Drain

7

8

11

12

13

14

N

Depot

Def

Ward Bdy

GP

BM 5.32m

TOWNGATE EAST

Drain

Sheepskin Ha...

14

15

16

17

HALL MEADOWS ROAD

Drain

Drain

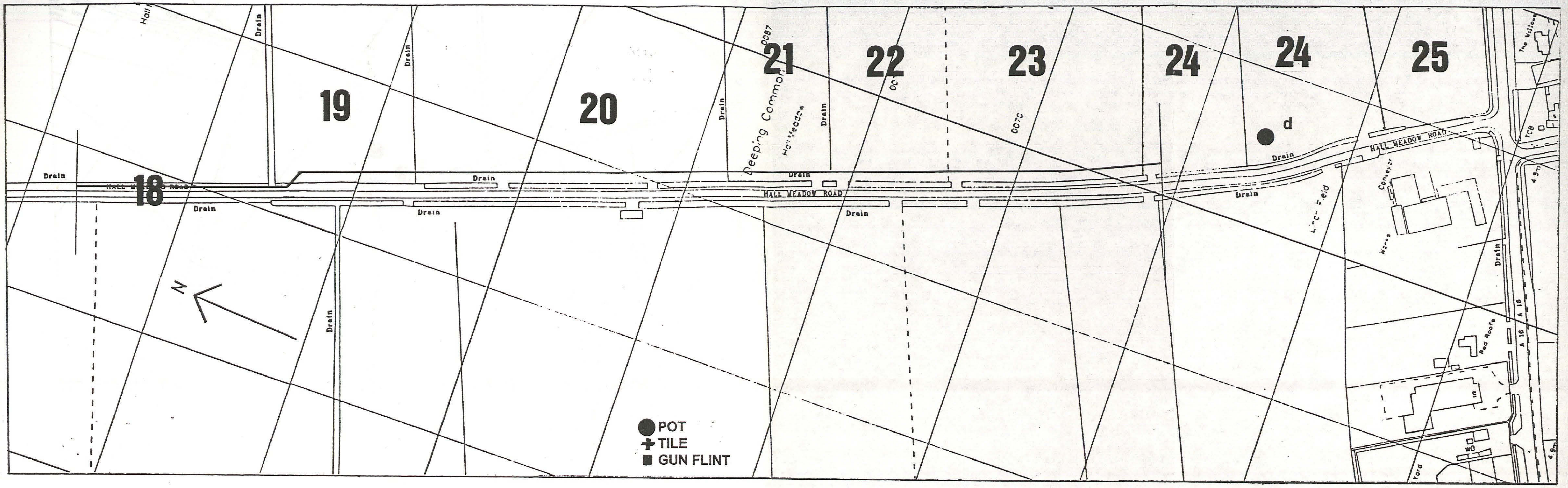
POT

TILE

GUN FLINT

Linch Field

Fig. 7b


18
19
20
21
22
23
24
24
25
d
Drain
HALL MEADOW ROAD
Deeping Common
Linch Field
Conveyor
Red Roofs
POT
TILE
GUN FLINT

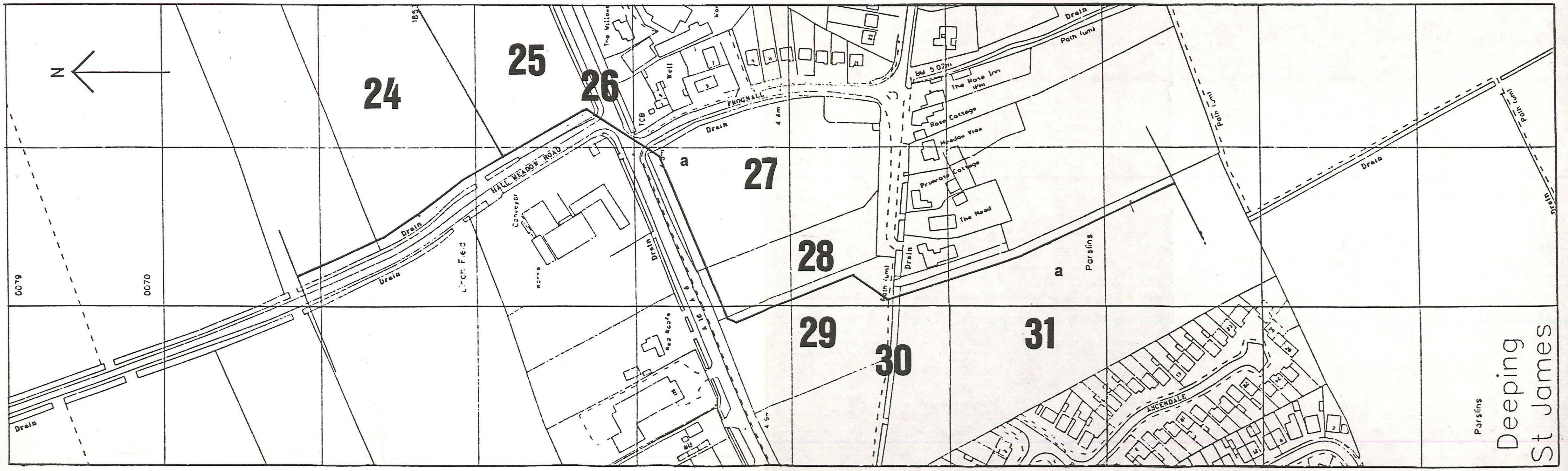
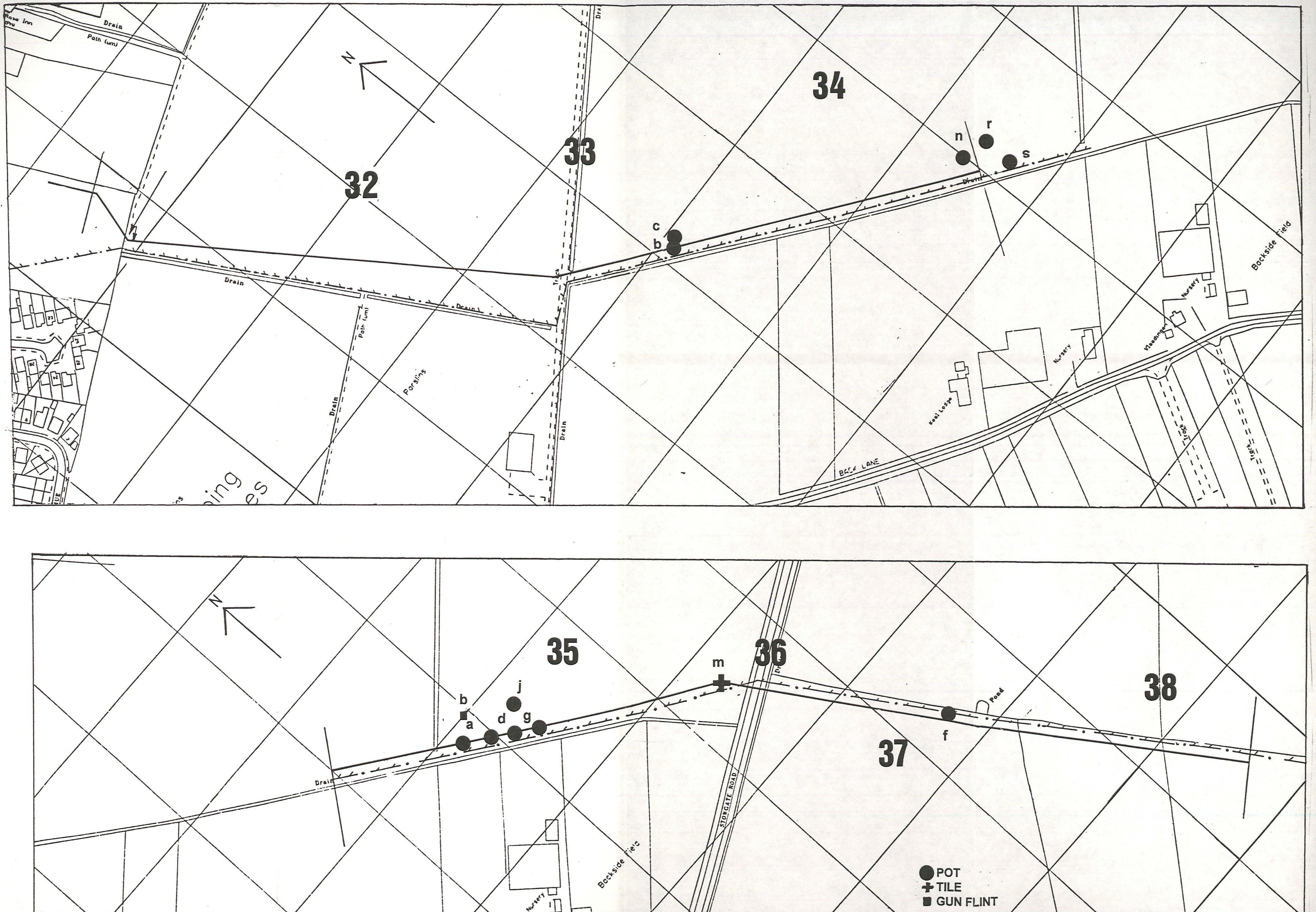
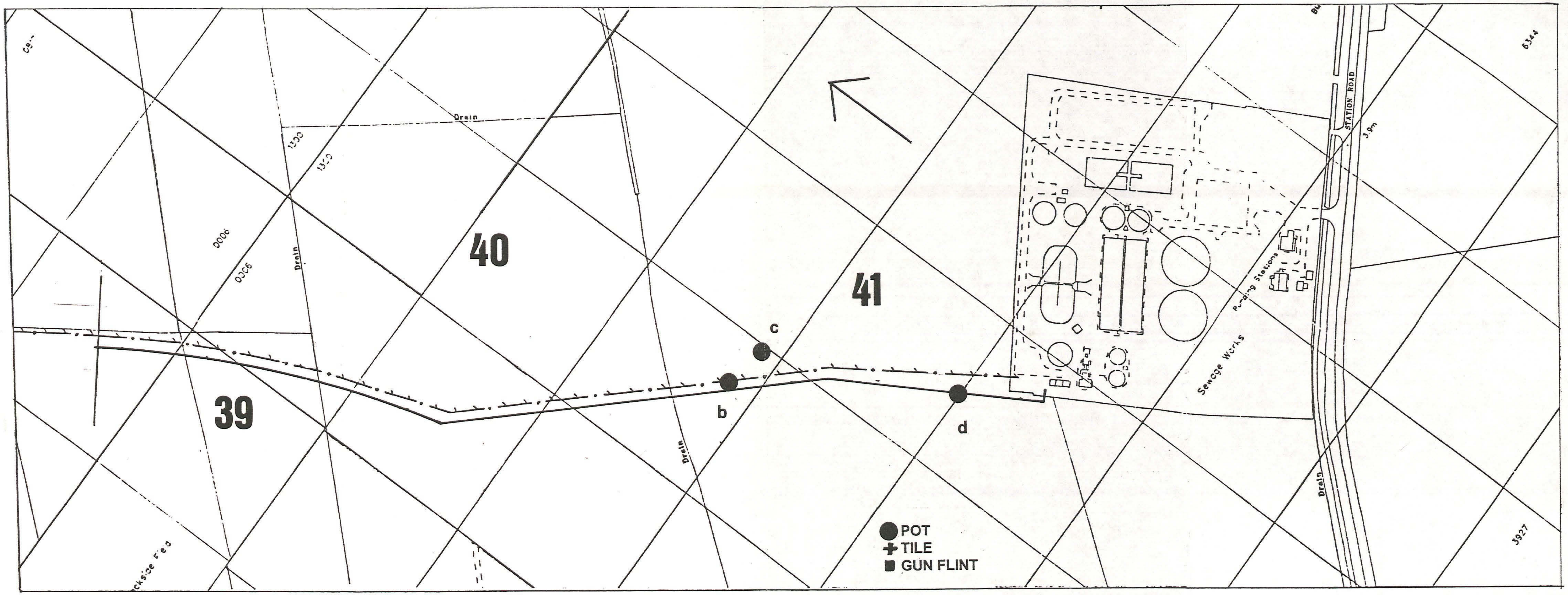

24
25
26
27
28
29
30
31
a
a
HALL MEADOW ROAD
FROGHALL
Drain
Linch Field
Conveyor
Red Roofs
The Rose Inn
Rose Cottage
Meadow View
Primrose Cottage
The Head
Parslins
ASCENDALE
Path (um)
Parslins
Deeping St James

Fig. 7c



N
32
33
34
35
36
37
38
Drain
Path (um)
Parsins
BACK LANE
Backside Field
Nursery
Track
STOWGATE ROAD
Pond
c
b
n
r
s
a
d
g
j
m
f
POT
TILE
GUN FLINT

Fig. 7d



Drain
9000
9006
Drain
40
41
39
c
b
d
Drain
Sewage Works
Pumping Stations
STATION ROAD
39m
Drain
6344
3927
POT
TILE
GUN FLINT

Fig. 7e

A F Howland Associates
Geotechnical Engineers

Site: MARKET DEEPING 16. DEC 98

Borehole Number: 1

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 6.00m open hole to 6.53m	6.68	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	513295 E 310829 N	07/10/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
						(0.50)	TOPSOIL? (dark brown very clayey organic fine to coarse sand with dark grey and brown fine to medium gravel and root networks)		
0.40	D1P				6.18	0.50			
						(0.50)	Dark brown slightly sandy silty CLAY, with occasional fine to medium gravel and roots		
1.00	D2P				5.68	1.00			
1.20-1.65	CPT N=21	0.00	DRY	6/4,5,6,6			Medium dense white, dark grey, light brown and brown very sandy rounded and subrounded fine to coarse flint GRAVEL		
1.20	D3P								
1.20-1.70	B1								
1.60	W1			Water strike(1) at 1.60m, not sealed.					▽1
2.00-2.45	CPT N=21	1.90	1.90	7/4,5,5,7					
2.00-2.50	B2								
3.00-3.45	CPT N=25	2.90	2.50	4/5,6,6,8					
3.00-3.50	B3					(4.20)			
4.00-4.45	CPT N=17	3.90	2.40	5/3,4,5,5					
4.00-4.50	B4								
5.00-5.45	CPT N=13	4.90	2.70	3/3,3,3,4					
5.00-5.20	B5								
5.20-5.50	B6				1.48	5.20	Grey and brown mottled locally sandy silty CLAY, with fine to medium gravel and occasional grey rock fragments. Recovered in a softened condition		
6.00	D1					(1.20)			
6.40-6.43	CPT 50*/30	6.00	4.00	50/	0.28	6.40			
6.40-6.50	B7			07/10/98:3.70m	0.15	6.53	Grey LIMESTONE, recovered as moderately strong gravel size fragments in a matrix of softened brown slightly sandy silty clay		
6.50-6.53	CPT 50*/30	6.00	3.70	50/					
							Borehole completed at 6.53m		

Remarks

1. Original borehole position located at pumping station. Due to uncertainty of service positions it was relocated to road verge. 2. Hand dug pit to 1.20m to check for services. No immediate services detected.
3. Approximately 100 litres of water added to assist drilling between 1.20 and 3.00m.
4. Groundwater encountered at 1.60m, remained standing at 1.60m.
5. Chiselling required to advance borehole: 6.40 to 6.50m in 0.50hrs.
6. Piezometer tip installed at 6.30m.

See key sheet for symbols and abbreviations

Scale (approx): 1:50

Logged By: JCG

Figure No.: 98.211.1

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	2

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 5.50m open hole to 6.60m	6.17	Anglian Water Services Limited, Lincoln	98.211
	Location: 513569 E 310854 N	Dates: 16/09/98	Engineer	Sheet: 1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
0.50	D1P				5.57	(0.60) 0.60	MADE GROUND (greyish brown clayey sand and sandy clay, with gravel and stone, and gravel and cobble size pieces of granite)		
						(0.60)	Greyish brown very clayey silty fine to coarse SAND, with much subangular fine to medium flint gravel		
1.20-1.65 1.20 1.20-1.70 1.30	CPT N=23 D2P B1 W1	0.00	DRY	6/4,5,7,7 Water strike(1) at 1.30m, sealed at 5.50m.	4.97	1.20	Medium dense brown, grey and cream slightly silty sandy to very sandy subangular fine to coarse flint GRAVEL		▽1
2.00-2.45 2.00-2.50	CPT N=26 B2	1.90	1.50	8/5,6,7,8					
3.00-3.45 3.00-3.50	CPT N=32 B3	2.90	1.90	8/7,8,8,9		(3.90)	....becoming dense and very sandy		
4.10-4.55 4.10-4.60	CPT N=32 B4	4.00	1.90	9/7,8,8,9					
5.00-5.45 5.00-5.10 5.10-5.50	CPT N=16 B5 B6	4.90	2.10	5/3,4,4,5	1.07	5.10	....becoming brown silty fine coarse SAND and GRAVEL, with occasional clay pockets		
6.00	D1					(1.30)	Firm greyish brown silty CLAY, with occasional decayed root traces at top of stratum. With depth becomes stiff and mainly grey in colour		
6.40-6.42 6.40-6.60 6.60-6.61	CPT 50*/20 B7 CPT 50*/10	5.50 5.50	DRY DRY	50/ 50/ 16/09/98:DRY	-0.23 -0.43	6.40 6.60	Grey LIMESTONE with stiff clay bands, recovered as softened grey silty clay with gravel and cobble size fragments of strong grey argillaceous limestone		
							Borehole completed at 6.60m		

Remarks

1. Hand dug pit to 1.20m to check for services. 300mm dia possible storm pipe encountered in pit at 1.20m depth, 2.20m distance from wall. Cables detected 3.00m from wall.
2. 2nd pit excavated to 1.20m depth to ensure BH clear of services. Encountered groundwater at 1.20m.
3. Groundwater stuck at 1.30m during drilling, and remained standing at 1.30m.
4. Approximately 25 litres of water added to assist drilling between 1.20 and 1.50m.
5. Chiselling required to advance borehole between 6.40 and 6.60m for 0.50hrs.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.2

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	3

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 6.10m open hole to 7.00m	5.81	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	514120 E 311104 N	14/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
						(0.15)	Brown TOPSOIL		
0.15	D1P				5.66	0.15			
						(0.25)	Firm to stiff dark brown silty CLAY with occasional orange brown mottling, fine gravel and roots		
0.40	D2P				5.41	0.40			
						(0.60)			
1.00	D3P				4.81	1.00	Firm to stiff locally stiff grey, orange brown and olive mottled silty CLAY with occasional fine to medium gravel		
						(0.20)			
1.20-1.65	CPT N=29	0.00	DRY	6/5,7,7,10	4.61	1.20			
1.20	D4P						Firm orange brown slightly sandy silty CLAY with occasional dark brown mottling, fine to medium gravel and medium and coarse sand pockets		
1.20-1.70	B1								
2.00-2.45	CPT N=37	1.90	1.50	9/7,9,10,11			Medium dense becoming dense dark grey, white and brown very sandy rounded and subrounded fine to medium flint GRAVEL. Locally clayey at top of strata		▽1
1.90	W1			Water strike(1) at 1.90m, not sealed.					
2.00-2.50	B2								
3.00-3.45	CPT N=55	2.90	2.00	9/9,11,15,20					
3.00-3.50	B3								
						(4.60)			
4.00-4.45	CPT N=47	3.90	2.40	10/9,9,12,17					
4.00-4.50	B4								
5.00-5.45	CPT N=48	4.90	2.70	8/9,10,12,17					
5.00-5.50	B5								
5.80	D1				0.01	5.80	Soft brown silty CLAY with occasional dark grey and orange brown mottling		
						(0.70)			
6.50-6.95	SPT N=25	6.10	4.10	6/4,5,7,9	-0.69	6.50	Stiff dark grey silty CLAY, with light grey and grey fine sand/silt pockets		
6.50	D2					(0.50)			
				14/09/98:4.10m	-1.19	7.00	Borehole completed at 7.00m		

Remarks

1. Hand dug pit to 1.20m to check for services. None detected.
2. Groundwater struck at 1.90m, and remained standing at 1.90.
3. Approximately 75 litres of water added to assist boring between 1.20 and 2.50m.
4. Piezometer tip installed at 5.80m.

Scale (approx)	Logged By
1:50	JCG

Figure No. 98.211.3

See key sheet for symbols and abbreviations

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	4

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 5.30m open hole to 5.60m	4.90	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	514586 E 311333 N	15/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
					4.75	(0.15) 0.15	Brown TOPSOIL		
0.50	D1P				4.30	(0.45) 0.60	Firm brown slightly sandy silty CLAY, with occasional fine to medium gravel and rootlets		
						(0.60)	Soft brown with some grey mottling silty CLAY, with occasional fine to medium gravel		
1.20-1.65 1.20 1.20-1.70 1.30	CPT N=25 D2P B1 W1	0.00	DRY	7/4,6,7,8 Water strike(1) at 1.30m, sealed at 5.30m.	3.70	1.20	Medium dense brown, light brown, grey and cream very sandy subangular fine to coarse flint GRAVEL. Becoming dense with depth		▽1
2.00-2.45 2.00-2.50	CPT N=30 B2	1.90	1.30	5/4,8,9,9					
3.10-3.55 3.10-3.60	CPT N=47 B3	3.00	2.00	8/9,10,12,16		(3.50)			
4.00-4.45 4.00-4.50	CPT N=55 B4	3.90	1.90	9/9,12,15,19			....becoming very dense		
4.70	D1				0.20	4.70	Stiff grey indistinctly fissured silty CLAY, with occasional small pockets and partings of light grey sandy silt		
5.10-5.30	B5				-0.20	(0.40) 5.10			
5.10-5.30	U1	4.90	DRY	150F blows					
5.30-5.33	CPT 50*/30	5.30	DRY	50/		(0.50)	Friable grey very sandy SILT, with fragments of very weak siltstone, occasional belemnites and fossil traces. Below 5.30m, with many fragments of weak grey calcareous SILTSTONE		
5.30-5.60	B6								
5.60-5.62	CPT 50*/20	5.30	DRY	50/ 15/09/98:DRY	-0.70	5.60			
							Borehole completed at 5.60m		

Remarks

1. Hand dug pit to 1.20m depth to check for services. None detected.
2. Groundwater struck at 1.30m, and remained standing at 1.30m.
3. Approximately 50 litres of water added to assist drilling between 1.20 and 2.00m.
4. Chiselling required to advance borehole: 5.3 to 5.6 in 0.50 hrs

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.4

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	5

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 5.00m open hole to 6.00m	4.90	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	514913 E 311332 N	18/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
						(0.30)	MADE GROUND (friable orange borwn sandy silty clay, with some flint gravel and rootlets)		
0.30	D1P				4.60	0.30	MADE GROUND (soft to firm brown, grey and orange brown mottled slightly sandy silty clay, with some flint gravel and occasional rootlets)		
						(0.90)			
1.20-1.65	CPT N=11	0.00	DRY	2/1,2,3,5	3.70	1.20	MADE GROUND (firm friable brown very silty clay, with some flint gravel, occasional pieces of brick and rootlets)		
1.20	D2P								
1.20-1.70	B1								
						(0.60)			
1.80	W1			Water strike(1) at 1.80m, sealed at 5.00m.	3.10	1.80	Medium dense becoming dense brown, cream and grey slightly silty very sandy subrounded and subangular fine to coarse flint GRAVEL		▽1
2.00-2.50	B2								
2.00-2.45	CPT N=23	1.90	1.50	7/5,5,6,7					
3.00-3.45	CPT N=32	2.90	2.00	7/7,8,8,9					
3.00-3.50	B3								
						(2.80)			
4.00-4.45	CPT N=40	3.90	2.50	8/8,9,10,13			....becoming slightly silty SAND and GRAVEL		
4.00-4.50	B4								
					0.30	4.60			
4.80	D1						Stiff grey with some brown mottling sandy very silty CLAY		
5.10-5.50	U1	5.00	DRY	100 blows		(0.90)			
5.50-5.55	CPT 50*/50	5.00	DRY	50/	-0.60	5.50			
5.50-6.00	B5						Stiff grey very silty CLAY, with some gravel size fragments of very weak silty sandstone and some whole fossil shells and fossil fragments. Recovered in a softened condition		
						(0.50)			
6.00-6.04	CPT 50*/40	5.00	DRY	50/ 18/09/98:DRY	-1.10	6.00			
							Borehole completed at 6.00m		

Remarks
1. Hand dug pit to 1.20m to check for services. None detected.
2. Groundwater struck at 1.80m and remained standing at 1.80m.
3. Approximately 75 litres of water added to assist drilling between 1.20 and 3.00m.
4. Chiselling required to advance borehole 5.50 to 6.00m for 0.50hrs.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.5

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	6

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 5.50m open hole to 7.00m	5.00	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	515808 E 311168 N	15/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
0.60	D1P				4.00	(1.00) 1.00	Brown fine SAND and firm brown silty CLAY with occasional fine gravel, shell fragments and roots		
1.20-1.65 1.20 1.20-1.70	CPT N=26 D2P B1	0.00	DRY	8/6,6,7,7	3.80	(0.20) 1.20	Orangey brown sandy silty CLAY/very clayey medium to coarse SAND, with brown fine to coarse gravel and occasional roots		
1.90 2.10-2.60	W1 B2			Water strike(1) at 1.90m, sealed at 5.50m.	2.90	(0.90) 2.10	Medium dense white, brown and dark grey sandy rounded to angular fine to coarse flint GRAVEL, with occasional very soft brown sandy very silty clay pockets		▽1
2.10-2.55	CPT N=33	2.00	1.90	9/7,8,8,10			Dense white, dark grey and brown very sandy rounded and subrounded fine to medium flint GRAVEL		
3.00-3.45 3.00-3.50	CPT N=38 B3	2.90	2.30	9/8,9,10,11					
4.00-4.45 4.00-4.50	CPT N=47 B4	3.90	3.00	9/9,10,12,16		(3.10)			
5.00-5.45 5.00-5.20 5.20-5.50	CPT N=18 B5 B6	4.90	2.60	7/4,4,5,5					
6.00	D1				-0.20	5.20 (0.80)	Stiff dark grey and dark brown mottled fissured silty CLAY		
6.50-6.95 6.50	SPT N=60 D2	5.50	DRY	9/11,13,16,20	-1.00	6.00 (1.00)	Very stiff dark grey fissured silty CLAY		
				15/09/98:DRY	-2.00	7.00	Borehole completed at 7.00m		

Remarks

1. Hand dug pit to 1.20m to check for services. 2 No unknown services detected at 1.00 and 1.80m east of position.
2. Groundwater struck at 1.90m and remained standing at 1.90m.
3. Approximately 50 litres of water added to assist drilling between 1.20 and 5.00m.

Scale (approx)	Logged By
1:50	JCG

Figure No. 98.211.6

See key sheet for symbols and abbreviations

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	7

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 4.90m open hole to 7.00m	4.85	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	515900 E 310924 N	17/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
						(0.40)	Brown TOPSOIL		
0.40	D1P				4.45	0.40			
						(0.60)	Firm brown silty CLAY, with occasional fine gravel and roots		
1.00	D2P				3.85	1.00			
						(0.20)	Firm brown silty CLAY, with occasional grey and orange brown mottling		
1.20	D3P				3.65	1.20			
1.20-1.65	U1	0.00	DRY	40 blows		(0.30)			
					3.35	1.50	Soft to firm orange brown and grey mottled silty CLAY		
1.70	W1			Water strike(1) at 1.70m, sealed at 4.90m.			Medium dense white, grey and brown very sandy rounded to subangular fine to coarse flint GRAVEL		▽1
1.70	D1								
2.00-2.50	B1								
2.00-2.45	CPT N=25	1.90	1.80	7/5,6,7,7					
3.00-3.45	CPT N=30	2.90	1.60	8/7,7,8,8		(3.00)			
3.00-3.50	B2								
4.00-4.45	CPT N=24	3.90	1.90	6/5,6,7,6					
4.00-4.50	B3								
					0.35	4.50			
4.60	D2					(0.50)	Stiff dark greyish brown silty CLAY with occasional dark grey mottling		
5.00-5.45	U2	4.90	DRY	48 blows	-0.15	5.00	Very stiff dark grey fissured locally thinly laminated silty CLAY		
5.50	D3								
6.00	D4					(2.00)			
6.50-6.95	U3	4.90	DRY	72 blows			....becoming very stiff		
7.00	D5			17/09/98:DRY	-2.15	7.00			
							Borehole completed at 7.00m		

Remarks

1. Hand dug pit to 1.20m to check for services. None detected.
2. Groundwater struck at 1.70m and remained standing at 1.70m.
3. Approximately 50 litres of water added to assist drilling between 1.20 and 2.00m.
4. Piezometer tip installed at 4.50m.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	JCG

Figure No. 98.211.7

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	9

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 4.00m open hole to 7.00m	3.99	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	516092 E 310385 N	16/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
					3.79	(0.20) 0.20	Brown TOPSOIL		
0.40	D1					(0.50)	Stiff (desiccated) orange brown slightly sandy silty CLAY, with occasional gravel and rootlets		
0.70	D2				3.29	0.70			
						(0.50)	Orange brown slightly clayey silty fine to coarse SAND, with much subrounded and subangular fine to coarse flint gravel, and some pockets of soft to firm clay		
1.20-1.65	CPT N=24	0.00	DRY	6/4,6,7,7	2.79	1.20			
1.20-1.70	B1						Medium dense to dense brown becoming grey slightly silty sandy to very sandy subangular and subrounded fine to medium and a little coarse flint GRAVEL		▽1
1.40	W1			Water strike(1) at 1.40m, sealed at 3.50m.					
2.00-2.45	CPT N=32	1.90	1.50	8/7,8,8,9					
2.00-2.50	B2					(2.00)			
3.00-3.45	CPT N=18	2.90	2.20	6/4,4,5,5					
3.00-3.20	B3								
3.20-3.50	B4				0.79	3.20			
3.70	D3						Stiff grey indistinctly laminated silty CLAY, with some whole fossil shells and fossil fragments		
4.00-4.45	U1	3.50	DRY	45 blows					
4.50	D4								
4.80	D5						....becoming stiff to very stiff, fissured, laminated in places, locally friable. Mainly very stiff at depth		
5.00-5.45	U2	4.00	DRY	67 blows		(3.80)			
5.50	D6								
6.00	D7								
6.50-6.95	U3	4.00	DRY	115 blows					
7.00	D8			16/09/98:DRY	-3.01	7.00	Borehole completed at 7.00m		

Remarks
1. Hand dug pit to 1.20m to check for services.
2. Groundwater struck at 1.40m and remained standing at 1.40m
3. Approximatley 60 litres of water added to assist drilling between 1.20 and 2.00m.
4. Piezometer tip installed at 3.20m.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No.
98.211.9

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	10

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 3.80m open hole to 7.00m	4.40	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	516254 E 309734 N	18/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
					4.20	(0.20) 0.20	TOPSOIL		
0.50	D1P					(0.80)	Soft to firm orange brown and grey mottled slightly sandy silty CLAY, with some fine to coarse gravel		
					3.40	1.00			
1.20-1.65	CPT N=23	0.00	DRY	8/6,5,6,6	3.20	(0.20) 1.20	Firm grey, brown and orange brown mottled silty CLAY, with occasional gravel and a little decayed organic matter		
1.20	D2P								
1.20-1.70	B1								
1.70	W1			Water strike(1) at 1.70m, sealed at 3.80m.			Medium dense brown, grey and cream slightly silty sandy to very sandy subangular fine to coarse flint GRAVEL. Becomes mainly brown with depth		▽1
2.00-2.50	B2								
2.00-2.45	CPT N=26	1.90	1.80	7/6,6,7,7		(2.10)			
3.00-3.45	CPT N=15	2.90	2.10	6/5,3,3,4					
3.00-3.30	B3								
3.30-3.50	B4				1.10	3.30	Firm to stiff brownish grey silty CLAY, with occasional fossil fragments		
3.80	D1								
4.00-4.45	U1	3.80	DRY	24 blows					
						(1.70)			
4.50	D2						....indistinctly fissured		
4.80	D3								
5.00-5.45	U2	3.80	DRY	56 blows	-0.60	5.00	Stiff becoming very stiff grey fissured silty CLAY, with occasional fossil fragments		
5.50	D4								
6.00	D5					(2.00)	....locally becomes laminated and friable		
6.50-6.95	U3	3.80	DRY	130 blows					
7.00	D6			18/09/98:DRY	-2.60	7.00	Borehole completed at 7.00m		

Remarks

1. Hand dug pit to 1.20m to check for services. None detected.
2. Groundwater struck at 1.70m and remained standing at 1.70m.
3. Approximately 75 litres of water added to assist drilling between 1.20 and 2.00m.

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.10

See key sheet for symbols and abbreviations

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	11

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 3.80m open hole to 7.00m	4.52	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	516754 E 309359 N	17/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
							Firm to stiff greyish brown silty CLAY, with occasional roots and rootlets		
0.50	D1P					(1.00)			
					3.52	1.00			
						(0.20)	Stiff grey and brown mottled fissured silty CLAY with some rootlets		
1.20	D2P				3.32	1.20			
1.20-1.65	U1	0.00	DRY	20 blows					
						(0.60)	Soft to firm orange brown with a little grey mottling sandy silty CLAY, with occasional fine to medium gravel		
1.70	D1				2.72	1.80			
2.00-2.45	CPT N=31	1.90	1.50	8/6,7,9,9			Dense brown, light brown, grey and cream slightly silty very sandy subrounded and subangular fine to coarse flint GRAVEL. With depth, becomes mainly brown and subangular to angular		
2.00-2.50	B1								
2.30	W1			Water strike(1) at 2.30m, sealed at 3.80m.					▽1
						(1.70)			
3.00-3.45	CPT N=36	2.90	2.00	9/8,9,9,10					
3.00-3.50	B2								
					1.02	3.50			
3.60	D2						Stiff grey fissured silty CLAY, with occasional fossil fragments. Becoming very stiff with depth		
4.00-4.45	U2	3.80	DRY	25 blows					
4.50	D3								
4.80	D4								
5.00-5.45	U3	3.80	DRY	72 blows					
						(3.50)			
5.50	D5								
6.00	D6								
6.50-6.95	U4	3.80	DRY	150 blows					
7.00	D7			17/09/98:DRY	-2.48	7.00	....becoming very silty		
							Borehole completed at 7.00m		

Remarks

1. Hand dug pit to 1.20m to check for services. 0.10m dia glaze duct (possibly British Telecom) at 0.80m depth detected 0.20m from position.
2. Groundwater struck at 2.30m and remained standing at 2.30m.
3. Approximately 75 litres of water added to assist drilling between 1.70 and 3.00m.
4. Piezometer tip installed at 3.30m.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.11

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	12

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 4.50m open hole to 7.00m	4.55	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	517280 E 308578 N	25/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
0.20	D1				4.35	(0.20) 0.20	Brown TOPSOIL		
0.40	D2				4.25	0.30	MADE GROUND (reddish brown clayey sand and gravel size fragments of granite)		
1.00	D3					(0.90)	MADE GROUND? (firm brown and grey mottled slightly sandy silty clay, with occasional gravel. By 1.00m, becoming brown and sandy, with some gravel, occasional fragments of granite and pockets of soft very sandy clay)		
1.20-1.65	CPT N=32	0.00	DRY	9/8,8,7,9	3.35	1.20			
1.20-1.70	B1								
1.50	W1			Water strike(1) at 1.50m, sealed at 4.50m.			Dense brown with some grey slightly silty very sandy subangular and subrounded fine to coarse flint GRAVEL		▽1
2.00-2.45	CPT N=36	1.90	1.70	9/8,9,9,10					
2.00-2.50	B2					(1.80)			
3.00-3.45	CPT N=57	2.90	2.00	11/9,10,15,23	1.55	3.00			
3.00-3.50	B3						Very dense grey, brown and cream sandy becoming very sandy subrounded and subangular fine to coarse flint GRAVEL and occasional cobbles. Driller reported large fragments of rock		
						(1.30)			
4.00-4.45	CPT N=18	3.90	2.10	8/5,5,4,4					
4.00-4.30	B4								
4.30-4.50	B5				0.25	4.30	Firm to stiff grey indistinctly laminated silty CLAY, with occasional fossil fragments		
4.80	D4								
5.00-5.45	U1	4.50	DRY	75 blows					
5.50	D5						....becoming stiff grey fissured very silty CLAY, with occasional fossil fragments. Becomes very stiff at base		
						(2.70)			
6.00	D6								
6.50-6.95	U2	4.50	DRY	120 blows					
7.00	D7			25/09/98:DRY	-2.45	7.00	Borehole completed at 7.00m		

Remarks
1. Hand dug pit to 1.20m to check for services.
2. Groundwater struck at 1.50m, and remained standing at 1.50m.
3. Approximately 75 litres of water added to assist drilling between 1.20 and 3.00m.

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.12

See key sheet for symbols and abbreviations

A F Howland Associates
Geotechnical Engineers

Site: MARKET DEEPING			Borehole Number: 13
Boring Method: Cable Percussion	Diameter: 150mm Cased to 4.50m open hole to 7.00m	Ground Level (mOD): 4.61	Client: Anglian Water Services Limited, Lincoln
	Location: 517330 E 308508 N	Dates: 22/09/98	Engineer:
			Job Number: 98.211
			Sheet: 1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
							MADE GROUND (firm brown sandy silty clay with gravel, pieces of concrete and brick fragments)		
0.50	D1					(0.70)			
					3.91	0.70			
1.00	D2						MADE GROUND? (stiff desiccated brownish grey sandy silty clay, with some fine to coarse gravel and rare brick traces)		
1.20-1.65	U1	0.00	DRY	30 blows		(0.80)			
					3.11	1.50			
1.70	D3					(0.50)	Soft to firm orange brown with a little grey mottling sandy silty CLAY, with occasional fine to medium gravel		
2.00-2.45	CPT N=31	1.50	DRY	8/6,7,9,9	2.61	2.00			
2.00-2.50	B1						Dense brown, light brown, grey and cream slightly silty very sandy subangular and subrounded fine to coarse flint gravel. Some orange brown at top of stratum		▽1
2.60	W1			Water strike(1) at 2.60m, sealed at 4.50m.					
3.00-3.50	B2								
3.00-3.45	CPT N=36	2.90	2.50	7/8,9,9,10		(2.40)			
4.00-4.45	CPT N=20	3.90	2.90	7/5,6,5,4			....becoming medium dense		
4.00-4.40	B3								
4.50	D4				0.21	4.40			
							Stiff grey fissured silty CLAY with occasional fossil fragments. Becoming stiff and very stiff with depth		
5.00-5.45	U2	4.50	DRY	52 blows					
5.50	D5					(2.60)			
6.00	D6								
6.50-6.95	U3	4.50	DRY	115 blows					
7.00	D7			22/09/98:DRY	-2.39	7.00			
							Borehole completed at 7.00m		

Remarks
1. Hand dug pit to 1.20m to check for services.
2. Groundwater struck at 2.60m and remained standing at 2.60m.
3. Approximately 150 litres of water added to assist drilling between 2.00 and 3.50m.
4. Piezometer tip installed at 4.40m.

See key sheet for symbols and abbreviations

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.13

A F Howland Associates
Geotechnical Engineers

Site	Borehole Number
MARKET DEEPING	14

Boring Method	Diameter	Ground Level (mOD)	Client	Job Number
Cable Percussion	150mm Cased to 4.50m open hole to 7.00m	4.53	Anglian Water Services Limited, Lincoln	98.211
	Location	**Dates**	**Engineer**	**Sheet**
	517338 E 308494 N	22/09/98		1/1

Depth m	Samples / Tests	Casing Depth m	Water Depth m	Field Records	Level (mOD)	Depth m (Thickness)	Description	Legend	Water
0.40	D1					(0.80)	MADE GROUND (soft to firm brown sandy silty clay, with much fine to coarse flint gravel, some rootlets and brick fragments)		
0.80	D2				3.73	0.80			
1.20-1.65	U1	0.00	DRY	20 blows		(0.60)	Firm to stiff brown slightly sandy silty CLAY, with some fine to medium flint gravel		
					3.13	1.40			
1.70	D3					(0.40)	Soft friable orange brown very sandy silty CLAY, with occasional fine to medium flint gravel		
2.00-2.45	CPT N=25	1.90	1.90	6/5,6,7,7	2.73	1.80			
2.00-2.50	B1						Medium dense brown, grey and cream slightly silty sandy subangular and subrounded fine to coarse flint GRAVEL. Becomes very sandy in places		▽1
2.40	W1			Water strike(1) at 2.40m, sealed at 4.50m.					
3.00-3.45	CPT N=26	2.90	2.50	7/6,5,7,8		(2.50)			
3.00-3.50	B2								
4.00-4.45	CPT N=17	3.90	2.70	8/6,4,4,3					
4.00-4.30	B3								
4.30-4.50	B4				0.23	4.30	Stiff grey indistinctly fissured silty CLAY, with occasional fossil fragments. A little brown mottling at top of stratum		
4.80	D4								
5.00-5.45	U2	4.50	DRY	80 blows					
5.50	D5					(2.70)	....becoming stiff to very stiff and fissured, laminated in places, very stiff at depth		
6.00	D6								
6.50-6.95	U3	4.50	DRY	115 blows					
7.00	D7			22/09/98:DRY	-2.47	7.00	Borehole completed at 7.00m		

Remarks
1. Hand dug pit to 1.20m to check for services.
2. Groundwater struck at 2.40m and remained standing at 2.40m.
3. Approximately 200 litres of water added to assist drilling between 1.80 and 2.80m.

Scale (approx)	Logged By
1:50	GNB

Figure No. 98.211.14

See key sheet for symbols and abbreviations