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**ARCHAEOLOGICAL INVESTIGATIONS
ON LAND NORTH OF THE A52 (SALTER'S WAY),
BETWEEN WELBY LODGE FARM
AND DEMBLEBY GORSE,
LINCOLNSHIRE
(HSW 98)**



A P S
ARCHAEOLOGICAL
PROJECT
SERVICES

62675 LI 3275
L13280
62676 LI 3276
L18000 L18001
35708 LI 32146 Roman
35709 LI 32147 Pmed
35710 LI 32148 Pmed
35714 Roman
35711 LI 32149 Pmed
62506 LI 32151 Pmed
62507 LI 32154 Pmed
62505 LI 32156 Roman

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(HSW 98)**

Work Undertaken For
Anglian Water Services Ltd

Report compiled by
Neil Herbert BA (Hons), AIFA

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1. SUMMARY

An archaeological evaluation, watching brief and geophysical survey were undertaken on the route of a water mains pipeline on land north of the A52, between Welby Lodge Farm and Dembleby Gorse, Lincolnshire (National Grid Reference SK 995367 to TF 017370). This programme of archaeological work was designed to assess the presence and nature of archaeological remains within the pipeline corridor, as anticipated by an earlier desk-based study and fieldwalking.

Linear and curvilinear gullies, tentatively ascribed to the prehistoric period (pre AD 43) were identified at the east end of the pipeline route. Romano-British features (AD 43-450) were also present, with the greatest density apparent toward the eastern end of the pipeline, in close proximity to a known bathhouse and possible villa complex (Scheduled Ancient Monument County Number 51). Here, the investigation identified structural remains and at least one intact infant burial. Geophysical survey showed that these features are part of a much more extensive complex of archaeological remains, perhaps representing a small roadside settlement.

The 'Long Hollow' Roman road, linking Romano-British settlements at Ancaster and Sapperton, crossed the pipeline and was recorded during the investigation. Another road, apparently linking the Long Hollow with the bathhouse site and beyond towards Mareham Lane, was also recognised.

Post-medieval activity was restricted to the construction of a possible trackway with associated field boundaries, at the centre of the pipeline route.

2. INTRODUCTION

2.1 Planning Background

Anglian Water Services Limited proposed the construction of a replacement water mains pipeline between Aswarby and Harrowby, Lincolnshire. Consultation was made with the Lincolnshire County Council Archaeology Section prior to this development, who initiated a programme of archaeological work in response to the proposal.

Previous desk-based assessment and fieldwalking indicated that evidence for multi-period occupation most probably survived within the route of the proposed water pipeline (Cope-Faulkner 1998). Consequently, the Assistant Archaeological Officer (LCC) recommended that an evaluation was completed within selected areas that had recognised archaeological potential.

Archaeological Project Services was commissioned by Anglian Water Services Limited to undertake the evaluation on land north of the A52, between Welby Lodge Farm and Dembleby Gorse, Lincolnshire (Figs. 1 and 2). The purpose of this evaluation was to identify the presence or absence, spatial arrangement, date and function of surviving archaeological features within the route of the pipeline. This work was undertaken between 10th and 19th August 1998, in accordance with a specification designed by Archaeological Project Services and approved by the Assistant Archaeology Officer (Appendix 1).

Romano-British structural remains, associated with at least one infant burial were recorded at the eastern end of the pipeline route, south of Dembleby Gorse. These features lay north of a bathhouse

complex, identified by the previous desk-based assessment (Cope-Faulkner 1998, Fig.9). To clarify the extent of these remains, the Assistant Archaeological Officer requested a geophysical survey of the surrounding area. This work was undertaken by Oxford Archaeotechnics (Appendix 8).

During and subsequent to the archaeological evaluation a watching brief was carried out during stripping and soil movement within the pipeline easement, in order to record additional archaeological remains and further elucidate the context of those features recorded by the evaluation. The watching brief monitored the entire length of the development and was completed between 17th August and 3rd September 1998.

It should be emphasised that the pipeline was re-routed away from the area where the extensive complex of Romano-British structural remains was identified. Instead, the course was shifted southwards and was subject to a second evaluation and watching brief (Herbert 1999a, 1999b).

2.2 Definition of an Archaeological Evaluation

Archaeological Evaluation is defined as:

'A limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, and relative quality; and it enables an assessment of their worth in a local, national or international context as appropriate' (IFA 1997).

2.3 Definition of an Archaeological Watching Brief

An Archaeological Watching Brief is defined as:

'A formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons within a specified area or site on land or inter-tidal zone or underwater, where there is a possibility that archaeological deposits will be disturbed or destroyed' (IFA 1997).

2.4 Topography, Geology and Soils

The area of investigation lies north of, and parallel with, the A52 near Heydour. The route covers land mid-way between the settlements of Cold Harbour (NGR SK 998369) and Threekingham (NGR TF 018371) and is centred approximately 9km east of Grantham (Fig.1). Presently, the ground is used for agricultural purposes and has been recently ploughed, or lies beneath crop cover.

In particular, the area of interest is situated between Welby Lodge Farm and Dembleby Gorse (Fig.2). Ground level at the western edge of the investigation area is at *c.* 90m OD, dipping eastwards into the Long Hollow valley to *c.* 60m OD, before rising to a height of *c.* 70m OD in the area of Dembleby Gorse. Land surrounding the course of the pipeline is defined by large arable fields, punctuated by patches of deciduous and mixed woodland, with most field boundaries being marked by hedges or drains (Plates 1 and 2).

The pipeline route traverses several soil types, incorporating Elmton 1 and Marcham Association rendzinas at the western extent of the development (Hodge *et al.* 1984, 242, 179) and soils of the Ragdale and Aswarby

Association, typically fine loamy gleyic brown calcareous earths, toward the eastern course (*ibid.* 293, 99). Fluvoglacial sand and gravel line the base of the Long Hollow valley, crossing the centre of the pipeline route. The surface deposits, in turn, seal a solid geology of Upper Lincolnshire Limestone (GSGB 1972).

Natural deposits found during the investigations comprised brown sands with variable limestone inclusions and occasional patches of solid limestone bedrock.

2.5 Archaeological Setting (Fig.2)

The area under development traverses a landscape known to contain evidence for occupation during the prehistoric (pre AD 43), Romano-British (AD 43-450), medieval (AD 1066-1485) and post-medieval (post AD 1485) periods. A site-specific summary of all known archaeology has already been produced (Cope-Faulkner 1998).

Prehistoric

A scatter of Mesolithic (8500-4000 BC) stone tools, found during fieldwalking south and west of Chain House Farm represents the earliest remains in proximity to the investigation area (Lane 1995, 11). Neolithic and Bronze Age (4000-1800 BC) stone tools are recorded further west. A small scatter of flint artefacts was found during fieldwalking, undertaken as part of a desk-based assessment, within Area 1 (Fig.2; Cope-Faulkner 1998).

Iron Age (800 BC-AD 43) archaeology is perhaps represented by cropmarks in the area of Heydour Lodge Farm, probably marking a settlement and surrounding field enclosures.

Romano-British

Cropmarks representing the course of a Roman road, known locally as the Long

Hollow, cross the pipeline route. This thoroughfare connected Romano-British settlement at Ancaster (to the north) and Sapperton (to the south). The present course of the A52 is believed to mark the line of a contemporary Roman road, known as the Salter's Way, that ran between Six Hills in Leicestershire (to the west) and Donnington (to the east). An additional road is suspected from cropmark evidence, believed to have served as a link between the Salter's Way and the Long Hollow (Fig. 2; Margary 1973).

A Roman bathhouse, possibly part of a villa complex, is recorded south of the A52, opposite Dembleby Gorse (de la Bere 1929). This structure was exposed by amateur excavations and appeared to incorporate a *hypocaust* (under-floor heating system) and tessellated floors, suggesting a degree of opulence. Moreover, additional building scatters of building debris, including brick, tile and Roman pottery, are known from Dembleby Gorse and Nightingale Plantation (north of the villa) suggesting additional structures of this period most probably occur in the near vicinity.

Medieval

Ropsley Grange, a medieval moated site, lies south of the A52 at the western edge of the pipeline route. This site comprises a range of buildings contained within a moat and bank, accessed from the southeast (Thompson 1955, 20).

Post-Medieval

Post-medieval archaeology is represented by a single building, that of a toll-house situated on the present course of the A52 (formerly Salter's Way).

3. PROJECT AIMS

Evaluation

The aims of the evaluation, as set by the Specification, were to establish the spatial arrangement, date and function of archaeological features, and to determine their relationship with any surrounding occupation and land-use (Appendix 1, 6.1.1-6.1.6).

Geophysical Survey

The objectives of the geophysical survey were to determine the extent and possible geometry of archaeological features, found by the evaluation, at the easternmost limit of the proposed pipeline route (Appendix 8, 1.4).

Watching Brief

The purpose of the watching brief was to preserve by record archaeological deposits revealed by the groundworks for the replacement water mains.

4. METHODS

Evaluation

A total of 14 trenches was opened for the evaluation. These were deliberately situated over known cropmark features, or in the vicinity of finds scatters recorded during an earlier programme of fieldwalking. It was originally planned that 15 trenches should be investigated, although Trench 10 remained unopened because it was situated within a cropped field. The trenches were originally placed along the course of the proposed pipeline, stated as lying 5m inside the most southerly field boundaries (Taylor *pers comm.*). This course was later revised, and the actual pipeline ran further to the north, resulting in most trenches lying outside the actual pipeline easement (Figs 3 and 7).

Trenches were opened using a mechanical excavator, under archaeological supervision (Plate 2). Those placed to target known cropmarks were dug in a linear fashion at a right angle to the feature, and measured approximately 1.5m wide and between 10m and 35m long. Other trenches, measuring 5m square, were dug over the site of known artefact scatters, as found by the previous phase of fieldwalking. A 1 metre square area of subsoil and ploughsoil within each trench was sieved through a 4mm mesh in order to enhance the retrieval of small artefacts. Moreover, the spoil from archaeological features and excavated trenches was subject to a metal detector survey.

All trenches were opened to the surface of the first archaeological or natural horizon and were then cleaned and excavated by hand. Each archaeological deposit, or feature, was allocated a unique reference number (context number) with an individual written description. A photographic record, including colour slide and black and white film, was compiled and sections and plans were drawn at scale 1:10 or 1:20. Recording of deposits was undertaken according to standard Archaeological Project Services practice, in conjunction with the Museum of London Site Manual (MOLAS 1994).

The position of each trench was recorded using a Geodolite Total Station in conjunction with a Psion Datalogger. This survey used known Ordnance Survey features to situate the trenches within the National Grid.

Geophysical Survey

An area measuring approximately 180m by 40m, at the eastern end of the proposed pipeline route, was subject to magnetic susceptibility and magnetometer survey (Fig.7). The topsoil magnetic susceptibility survey was undertaken using a Bartington Instruments MS2 meter (at 10m intervals)

and the magnetometer survey was completed with a Geoscan Research Fluxgate Gradiometer (sampling 4 readings per metre at 1m traverse intervals). A detailed record of the survey method and results are held at Appendix 8.

Watching Brief

The watching brief monitored the removal of ploughsoil from within the pipeline easement, which measured approximately 15m wide and over 3km long (Plate 4). Where features were identified these were cleaned and recorded as per the evaluation methodology. The position of all remains were surveyed using the Geodolite Total Station.

Pit [1010] was exposed towards the western edge of the pipeline easement during the watching brief. This feature was only partially investigated, and was backfilled at the request of the developer.

5. RESULTS

5.1 Phasing

Finds recovered from deposits identified in the evaluation and watching brief were examined and a date assigned where possible. Records of the deposits recorded in the field were also examined. A list of all contexts appears as Appendix 2. Groups were defined where several contexts had a recognisable functional relationship, and could be more readily discussed as a single stratigraphic unit.

Phasing was assigned based upon artefact dating, the nature of deposits, and their recognisable stratigraphic relationships. A stratigraphic matrix of all identified deposits was produced. A total of five phases was identified:

<i>Phase 1</i>	Natural geology
<i>Phase 2</i>	Undated deposits
<i>Phase 3</i>	Probable prehistoric deposits
<i>Phase 4</i>	Romano-British deposits
<i>Phase 5</i>	Post-medieval deposits

Archaeological contexts are listed below and described. Numbers in square brackets are the context numbers assigned in the field.

5.2 Phase 1: Natural geology

All Areas (Fig.2)

The earliest layers usually comprised brown sands with variable inclusions of limestone, although patches of solid limestone bedrock were also encountered [002, 005, 008, 018, 046, 027, 029, 032-3, 036-7, 049, 052, 060, 072, 080, and 999]. These layers represent natural formations of solid and drift geology, and were observed during both the evaluation and watching brief.

5.3 Phase 2: Undated deposits

Area 1 (Fig.3)

Evaluation: Trench 4, situated northwest of Chain Farm House, contained several features sealed beneath the ploughsoil.

A northwest-southeast linear cut [013], measuring approximately 0.8m wide by 0.3m deep and 2.9m long (to the limit of excavation), was recorded at the western edge of Trench 4 (Figs.4 and 6; Plate 3). This cut [013] contained a basal fill of mid brown sandy silt with frequent limestone inclusions [012], sealed by a spread of dark grey sandy silt [011]. The profile of [013] suggests that it represents a gully, sealed by

a process of natural silting [012] and a later dump of ashy soil [011]. No artefacts were retrieved from this sequence (Group 1).

Farther east, an irregular sub-circular cut [015] containing red-brown sandy silt [014] with frequent limestone inclusions, was exposed against the northern edge of Trench 4 (Figs.4 and 6; Plate 3 far ground). Cut [015] measured 1.1m long, 0.4m wide and 0.2m deep and is interpreted as a possible pit, though the proper function of this feature could not be determined (Group 2).

Although no archaeological features were found within Trench 2, situated at the western edge of Area 1, part of a millstone grit quernstone (used for grinding cereals) was recovered from the ploughsoil [024]. The quernstone is of the 'rotary' type and shows that crop-processing was probably carried out in the vicinity.

Watching Brief: Observations conducted during the removal of soil from the pipeline easement revealed several other undated features in proximity to the evaluation trenches. Two parallel linear cuts [1006 and 1008], following a northwest-southeast orientation, were exposed north of Trenches 2 and 3 (Fig.3). Each of these features measured approximately 2.5m wide and extended over a length of at least 35m (to the edge of the pipeline easement). Both [1006] and [1008] had broad, concave profiles, cut to a depth of between 0.2m and 0.3m. Each contained a single fill of mid brown silty sand [1005 and 1007], though no artefacts were retrieved from these layers. These parallel gullies had become infilled as a result of natural weathering processes (Group 3).

Farther east, the full extent of gully [013], first recorded during the evaluation, was exposed within the easement (Plate 4). This feature (re-numbered as context 1001)

measured 4.3m wide and 31m long (to the limit of stripping) and followed a northwest-southeast orientation. Excavations revealed that [1001] was dug to a depth of 0.3m into the natural geology, and had become infilled by a light-brown silty sand [1000] with frequent limestone inclusions (same as 012). No artefacts were retrieved from these deposits (also Group 1).

Area 2 (Fig.3)

Evaluation: Trench 9 contained a northeast-southwest orientated linear cut [039] measuring approximately 0.6m wide, 0.4m deep and 5m long (to the limit of excavation). This contained a basal fill of orange-brown clay [034], sealed by greyish-white silty sand [040], both of which incorporated thin lenses of organic material (Fig.10). Although no dateable artefacts were found, the feature most probably represents a gully (Group 4).

5.4 Phase 3: Probable prehistoric deposits

Area 3 (Fig.7)

A complex group of features was revealed within Trench 15, at the eastern edge of the pipeline route (Fig.8). The earliest remains comprised two parallel linear cuts [085 and 087], following a north-south orientation. Cut [087] measured 1.3m wide and contained mid brown silty sand [086] with frequent inclusions of grit and limestone. This most probably represents a gully (Group 10).

Farther east, cut [085] appeared to have steep sides and a narrow, blunt, flat base (Fig.11, Plate 5). This feature measured approximately 0.8m wide and 0.5m deep, containing a fill of red-brown silty sand [084]. The profile of [085], although truncated by [092], suggests the feature may

represent a gully or post-trench (also Group 10). A single fragment of broken flint blade, of possible prehistoric date, was retrieved from [084].

A later curvilinear feature [083] was dug into gully [087]. This measured 0.6m wide and 0.2m deep and arced between the western to southern edges of Trench 15. The profile displayed gradual sides leading to a flat base, which contained a fill of red-brown silty sand [082] with grit inclusions, and most probably represents a gully (Group 11). A circular cut [090], with a diameter of 0.3m and depth of 0.1m, was dug into the surface of this gully and is interpreted as a later posthole (Group 12).

Although most of this sequence is undated, the presence of a broken prehistoric flint tool from fill [084] suggests the nearby remains may well form part of a contemporary sequence. Moreover, the curvilinear appearance of gully [090] is a more typical feature of prehistoric remains.

5.5 Phase 4: Romano-British deposits

Area 1 (Fig.3)

Watching Brief: Topsoil stripping within the pipeline route at Heydour Lodge Farm revealed a large sub-circular feature [1010] at the edge of the easement. Excavations revealed that this was a substantial cut, measuring at least 7m in diameter (to the limit of excavation) and 1.2m deep. Orange sand with limestone inclusions [1009] filled this feature, which was backfilled by the contractors before a thorough investigation could be completed. Several fragments of Romano-British pottery and small pieces of burnt clay were recovered from [1009], together with animal bone from a single beast (Appendix 4). The latter suggests the pit was used for carcass disposal, although this may not have been the primary function

of this feature.

Area 2 (Fig.3)

Evaluation: A linear cut [035] following a northwest-southeast orientation was revealed at the western edge of Trench 5 (Fig.4). This feature was very broad with an uneven concave base, measuring approximately 6m wide, at least 2.7m long (to the limit of excavation) and 0.5m deep (Fig.9). Cut [035] contained a basal fill of dark grey-brown clayey silt [044] with occasional charcoal inclusions, sealed by a layer of compact white limestone [043/045] incorporating some large limestone fragments (50mm long). This was overlain by a spread of brownish white clayey silt [042] with frequent limestone inclusions (some 80mm long). It is most likely that [035] represents a sunken track that has been subject to later episodes of limestone re-surfacing, represented by [043/045] and then [042]. Although no artefacts were retrieved from this sequence of deposits, they lie on the route of a known cropmark feature, interpreted as the Long Hollow Roman road, linking settlement at Ancaster and Sapperton (Figs. 1 and 2). As such, it would not be unreasonable to assume that the remains represent the course of this thoroughfare (Group 5).

Area 3 (Fig. 7)

Evaluation: Trench 12 contained a layer of sandy clay with frequent sub-angular limestone fragments [051], dated by pottery to the 4th century. This layer had a convex upper boundary with the overlying ploughsoil and is interpreted as a road surface. Subsequent geophysical survey of the area surrounding Trench 12 revealed that this surface lay between two northeast-southwest orientated parallel linear features, interpreted as possible ditches flanking the course of a Roman road (Figs. 2 and 7).

In Trench 13 was a linear cut [065] at least 1.4m wide, 0.55m deep and 5m long (all these measurements were taken to the limit of excavation). This feature had regular vertical sides and contained an infant burial [066], found at the limit of excavation (Figs. 8 and 10, Plate 6). The burial was placed with the head toward the west, and appeared to represent an individual no older than *c.* 2.5 months (Appendix 5).

A layer of yellow-brown sand [062] with occasional charcoal, flint and limestone inclusions, sealed the infant, and contained the disarticulated remains of a second individual. It is possible that this partially recovered infant skeleton represents an additional burial, only just within the investigation area. Further probable human infant bones were observed in the trench side, though were not removed. An iron hook and small fragments of ceramic building material (CBM) were collected during the excavation of this deposit [062], together with an amount of 3rd century pottery, representing robber trench backfill.

The robber trench backfill [062] was covered by a deposit of dark grey-brown silty sand [061] with frequent grits and moderate limestone inclusions. A small iron nail and fine jet bead, together with a collection of cattle and sheep bones were retrieved from [061]. Quantities of structural material, including broken *tegulae*, *imbrices* (roof tile), and slate roof tile were also found in association with 4th century pottery. Cumulatively, these finds suggest that [061] represents a dump of re-deposited refuse and structural material, used to backfill [065].

Finally, cut [065] was sealed by a deposit of yellow-brown clayey sand [058] with frequent limestone (0.1m long) and occasional charcoal inclusions. The remains found within Trench 13 represent a robbed-out foundation trench, backfilled with

unwanted structural material, chiefly represented by small pieces of limestone and tile (Group 9).

A spread of mid brown clayey silt [059] with frequent limestone inclusions overlay the latest fill of the robber trench (Group 9), also covering the surrounding natural geology. This represents a horizon of structural debris outside the robber trench, reinforcing the impression that Roman stone structures stood nearby.

Romano-British artefacts were also recovered from the ploughsoil during sieving and metal-detector survey. The ploughsoil from Trenches 11 and 12 yielded a large collection of abraded tile. A collection of 3rd century pottery, bottle and window glass, slate roof tile, *tesserae* (pieces from a mosaic), and a coin of Constantius II (AD 337-61) was recovered from ploughsoil and spoil [057, 063 and 095] in the area of Trench 13. Other 3rd century pottery, iron nails and an iron ring, quantities of ceramic building materials and slag were found in ploughsoil [068 and 078] near Trench 15. A piece of coal and 2nd to 4th century pottery was retrieved from the ploughsoil [067 and 093] in Trench 14, together with fragments of roof slate and a fired clay spindle whorl.

Geophysical Survey: This non-intrusive investigation was completed in the area between Trenches 12 and 14 at the eastern end of the pipeline route (Fig. 7, Appendix 8). The work revealed a significant complex of additional archaeological features. Possible pits, concentrations of ceramic building material, ferrous material, linear and curvilinear features were identified in the survey area. Notably, robber trench [065] can be identified continuing outside Trench 13, connecting with a more extensive group of rectilinear features, most probably indicative of a Roman structural remains.

5.6 Phase 4: Post-medieval deposits

Area 2 (Fig. 4)

Watching Brief: Topsoil stripping within the pipeline easement revealed a series of features west of Trench 6 (Fig. 3). The most easterly was a linear cut [1030] following a northwest-southeast orientation, with steep sides and a narrow concave base, measuring 0.35m wide, 0.25m deep and at least 15m long (to the limit of excavation). This contained mid brown silty sand [1031] with occasional limestone inclusions (5mm long) and is interpreted as a gully (Group 7).

This gully ran parallel with, and 2.5m east of, a more substantial linear cut [1043]. The latter measured 2.9m wide and 0.5m deep, and was also recorded over a length of approximately 15m (to the limit of excavation). Cut [1043] contained a basal fill of yellow-brown sandy clay [1042] sealed by later deposits of the same material [1041 and 1040] though with greater quantities of limestone inclusions (50mm long). Cumulatively, these remains represent the course of a ditch, dated to the late 17th or early 18th century by a piece of clay pipe retrieved from fill [1040] (also Group 7).

Ditch [1043] formed the eastern edge to a sequence of yellow-brown silty sands [1048, 1046, 1045 and 1044] that extended over a width of *c.* 3.7m and length of approximately 15m (to the limit of excavations). This sequence of deposits sealed the natural geology, forming an artificial 'rise' with a convex upper surface, measuring 0.3m thick. Each layer in this sequence contained a variable quantity of limestone inclusions (50mm long), commonly observed as thin horizontal bands. It had a number of linear grooves, interpreted as cart tracks. These deposits represent the course of a possible road (Group 6), running parallel to a ditch and

gully (Group 7).

A linear northwest-southeast orientated cut [1054] was exposed 23m west of the possible road surface. This feature had gradual sides and a broad, concave profile, measuring 1.6m wide, 0.5m deep and 15m long (to the limit of excavations). A basal fill of dark brown silty sand [1053] was sealed by later layers of yellow-brown [1052] and dark brown [1051] sediments. No artefacts were retrieved from this sequence which is interpreted as a gully (Group 8), running parallel to (and most probably contemporary with) the nearby road (Group 6), ditch, and gully (Group 7).

Area 3 (Fig. 7)

Evaluation: Prehistoric gully [085] was truncated by a much shallower cut with a gradual concave profile [092], representing a gully (Fig. 11, Plate 5). A large cast-iron object was recovered from this gully, suggesting this feature dates to the post-medieval period (Group 16).

All Areas (Figs 3-5)

Deposits of loose mid brown silty clay with moderate limestone inclusions [001, 004, 007, 023, 010, 041, 026, 028, 020, 030, 047, 050, 057, 069 and 078] formed the latest archaeological horizon, revealed in all areas of the investigation. This layer measured approximately 0.3m thick and currently forms the modern ploughsoil.

In places, deposits of mid brown sandy silt [034, 031, 048, 051 and 070] had survived beneath the ploughsoil, and are interpreted as subsoil. Ploughmarks were observed in several areas [017], as were land-drains, though the latter are not identified in plan, in order to avoid obscuring recorded archaeological features.

6. DISCUSSION

Although the evaluation targeted limited areas along the route of the proposed water main, the evidence from this early work has been enhanced by the subsequent watching brief and geophysical survey. The later programme of works has enabled remains found during the evaluation to be placed within a broader contextual framework.

Natural deposits, although typically composed of sandy limestone brash, were prone to variation within and between the investigation areas. In particular, several trenches contained intact patches of limestone bedrock, whilst others contained looser stony spreads. The variability of the natural geology initially caused some uncertainty as to whether recorded features were of a natural or human origin, although the latter interpretation must be more likely if the proximity of surface finds is considered.

6.1 *Area 1: Overview*

The western part of the evaluation uncovered the remains of several features in an area south of Heydour Lodge Farm and west of Chain Farm House (Fig.2, Area 1). This lies west of the Long Hollow Roman road and south of a cluster of cropmarks that most probably represent a prehistoric settlement enclosure. Moreover, scatters of prehistoric and Romano-British finds were retrieved from this field during a previous programme of fieldwalking (Cope-Faulkner 1998, Figs 10 and 11). Although Trenches 1-3 were devoid of archaeological features, investigations within Trench 4, and the later watching brief, found the remains of several gullies and pits.

The gullies tended to follow a northwest-southeast alignment (Groups 1-3) and were typically no more than 0.3m deep, although

they varied in width between 2m (Group 3) and 5m (Group 1). A small pit of indeterminate function (Group 2) was recorded to the east of the gullies, and a much larger pit (around 1.2m deep) was recorded at their centre (Group 14). The latter contained an assemblage of artefacts that included Romano-British pottery and the remains of an individual cattle skeleton, perhaps originally deposited as a complete entity.

Although the large pit (Group 14) was the only dated feature, the proximity of other undated gullies (Groups 1-3) and a pit (Group 2) may suggest that these are of a similar date. Moreover, collections of Romano-British pottery and flint artefacts together with part of a rotary quernstone, found within the overlying ploughsoil, appear to reinforce this suggestion. It is also reasonable to state that these gullies and pits are most probably associated with cropmark features recorded to the north and south (Fig.2).

Post-medieval activity within Area 1 is represented by a north-south gully (Group 13). Although this feature is undated, the alignment is parallel with existing field boundaries and most probably represents more recent field enclosure.

6.2 *Area 2: Overview*

Trench 5 contained the remains of a sunken roadway with later limestone re-surfacing (Group 5) which had clearly been degraded as a result of ploughing. This feature had previously been identified as an arrangement of parallel linear cropmarks, interpreted as the Long Hollow Roman road, linking Romano-British settlements at Ancaster and Sapperton. The sunken road measured around 6m wide and was filled with deposits containing moderate inclusions of sub-angular limestone fragments, representing

later re-surfacing after the course of this thoroughfare had been further degraded by traffic erosion (Fig.9). No flanking ditches were present, and it is possible that these have been removed by ploughing or were simply not dug on this part of the thoroughfare, though it should be emphasised that a single ditch does appear on the aerial photograph of this section (Fig.3). Although the archaeological remains are undated, it is reasonable to assume that these represent the course of the Long Hollow Roman road.

An undated east-west gully (Group 4) found within Trench 9, on the eastern side of the Long Hollow valley, runs parallel to the nearest field boundary and, as such, may well represent more recent activity.

A complex of parallel northwest-southeast ditches (on a similar alignment to the Long Hollow road) and a possible road surface was investigated toward the base of the valley (Groups 6-8). The easternmost ditch (Group 7) in this group of features was dated by a fragment of clay pipe to the late 17th or early 18th century. Because the other (undated) features follow the same alignment, and lie in close proximity, it is probable that they are contemporary. It must be emphasised that the identification of the road surface (Group 6) was tenuous, though it had apparent cart ruts, and it would not be improbable considering the proximity of this feature to a nearby minor road that extends south from the A52, perhaps representing the course of a thoroughfare that originally continued northwards (Fig.2).

6.3 *Area 3: Overview*

Area 3 incorporated Trenches 11-15 and was situated at the eastern end of the pipeline development. A geophysical survey of part of this area was completed as part of the work programme (Appendix 8).

Trench 11 was devoid of archaeological features, and no artefacts were retrieved from the ploughsoil within this area. In contrast, Trench 12 contained a stone surface with a slight camber associated with 4th century pottery. Subsequent geophysical survey indicated that this stone surface extended northeast-southwest. The linear feature has been previously plotted as a cropmark and was believed to represent a road connecting the 'villa' site at Hacey with the Long Hollow Roman road (Fig.2). However, the geophysical survey has revealed the feature continuing beyond the A52 in a northeasterly direction, perhaps leading on to an existing track known as 'Green Lane', and thereafter towards the Mareham Lane Roman road.

Farther east, part of a linear east-west robber trench [065] was revealed within Trench 13. This feature contained a backfill of unwanted structural debris including limestone, tile and slate fragments. Moreover, an infant [066] was found buried towards the base of the rubble backfill, in association with an incomplete second individual (Fig.8, Plate 6). Infant burials are quite commonly associated with wall alignments and stone-built properties and are recorded at the nearby sites of Ancaster and Sapperton (Lane 1991; Simmons 1995). The situation of infant [066], as found within Trench 13, is somewhat unusual as the burial has taken place within the backfill of a robber trench, instead of the individual being situated adjacent to the walls of standing structures. A similar, though not identical practice, was recorded at Sleaford where an infant was buried within a layer of structural debris within a disused building (Herbert 1999).

If the line of the robber trench [065] is compared to the position of other features recorded by the geophysical survey it is clear that additional structural remains are present

within the surrounding area (Fig. 7). It is not clear whether these form the remains of several individual buildings, or are part of a much larger villa complex. Structural materials were also present within the ploughsoil in the vicinity of Trench 13, with window glass, stone and slate roof tiles, and some bottle glass of Roman date being collected. In addition, metal-detecting over the spoil from this trench recovered a mid 4th century coin, an issue of the Emperor Constantius II (AD 348-60).

Part of a bathhouse and probable villa complex, comprising several rooms, is known to lie south from Area 3 on the opposite side of the A52. The bathhouse was uncovered by a team of amateur archaeologists in the early 20th century and is perhaps best understood from a surviving photograph (Start 1993, 104). It is unlikely that the structural remains found within the proposed eastern route of the pipeline represent the northern continuation of this complex, because evaluation conducted to the south recorded an absence of connecting features (Herbert 1999a). However, other excavated villa sites, of which the bathhouse may form part, have incorporated groups of structures that extend over distances of between *c.* 60m (*eg* Norton Disney) and *c.* 100m (*eg* Winterton), making it feasible that the Haceby 'villa' extends for a similar distance in a direction other than north (Whitwell 1970, 85). Examples from the continent show that some of the more elaborate villas may extend over lengths of more than *c.* 130m (Percival 1976).

The question of whether the remains found north and south of the A52 represent part of a single complex may have been resolved by separate evaluation and watching brief investigations, suggesting that they are not physically connected (Herbert 1999a, 1999b). Instead, it is perhaps more reasonable to consider the more northerly

remains as evidence for separate buildings. From this discussion it is apparent that the Haceby 'villa' and surrounding Romano-British remains are more complicated than was previously known. If the villa does continue northwards, then the structural remains must show some form of relationship to the A52 (Salter's Way). Moreover, the position of probable structural remains found by geophysical survey appear to be mis-aligned with the course of a northeast-southwest Roman road (dated to the 4th century), which continues in the direction of Mareham Lane. In sum, the evidence from the geophysical survey and Trenches 12 and 13 has served to emphasise the intricate nature of this site, reinforcing the impression that the Roman occupation may constitute several phases of development, perhaps most probably representing a villa (to the south) and adjacent roadside settlement (to the north).

Farther east, hints of prehistoric settlement or other activity emerged from the remains found in the vicinity of Trench 15 lay at the extreme eastern limit of the proposed pipeline route. Several irregular linear and curvilinear features [083, 085, 087] together with a sub-circular cut [090] were revealed by the excavation (Fig. 8). Although most of the features did not contain any diagnostic artefacts, gully [085] held a single fragment of a broken flint tool, of probable prehistoric date. As such, the remainder of the nearby features may well be of a similar period. A later curvilinear gully [083] and posthole [090] may represent part of a prehistoric structure.

7. CONCLUSIONS

Archaeological investigations were undertaken along the route of a pipeline adjacent to the A52 near Heydour because remains of prehistoric, Roman and medieval date were known to be located on, or near, the pipeline course.

A cluster of probable prehistoric features was identified at the eastern end of the investigation area. However, the function and specific date of these features was not established. Trenches at the centre of the investigation area, on the site of a previously discovered flint scatter, did not, however, reveal any remains to account for the artefact concentration.

Two areas of Romano-British remains were identified. In the centre of the investigation area, and near to a cropmark complex, were several rather dispersed features including pits and ditches. Occupation debris was scarce in the central part of the investigation area and, therefore, these remains may relate to field systems associated with nearby habitation, rather than settlement itself. In addition, the course of the Long Hollow Roman road, known from cropmark evidence, was also confirmed. A second metalled road or track, possibly of post-medieval date, was revealed to the east of Long Hollow.

The second area of Romano-British remains was located north from the Hacey bathhouse and 'villa'. A further metalled track and robbed building foundations were revealed and a human infant burial discovered. Geophysical survey has shown that the excavated remains lie within a more extensive pattern of probable structural remains that most probably represent a roadside settlement.

In contrast, no medieval remains were

encountered during the investigation. Also, no waterlogged deposits were present and, in consequence, environmental material is only likely to survive through charring.

8. ACKNOWLEDGEMENTS

Archaeological Project Services would like to acknowledge the assistance of Mr Adam Berwick who commissioned this report on behalf of Anglian Water Services Limited. Mr Richard Snedmore and Mr Les Ellis of Anglian Water also kindly provided assistance with the project. The work was coordinated by Gary Taylor and this report was edited by Gary Taylor and Tom Lane. Barbara Precious identified the Roman pottery, Gary Taylor reported on the post-medieval finds and Paul Cope-Faulkner commented on the animal bone. Jo Simpson (South Kesteven Community Archaeologist) and Kate Orr (North Kesteven Heritage Officer) kindly allowed access to the relevant parish files.

9. PERSONNEL

Project Coordinator: Gary Taylor
Site Supervisor: Jenny Young
Watching Brief: Martin Griffiths, Ed Lewis, Rene Mouraille and Gary Taylor
Site Assistants: David Bower, Mike Garrett, Rachael Hall and Chris Moulis
Volunteers: Alex Howe and Sharon Keys
Surveying: Dale Trimble
Finds Processing: Denise Buckley
CAD Illustration: Neil Herbert
Post-excavation Analyst: Neil Herbert

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MOLAS Museum of London Archaeology Service

OAL Oxford Archaeotechnics Limited

RCHME Royal Commission on the Historical Monuments of England

SMR County Sites and Monuments Record number

11. ABBREVIATIONS

APS Archaeological Project Services

DoE Department of the Environment

GSGB Geological Survey of Great Britain

HMSO Her Majesties' Stationary Office

IFA Institute of Field Archaeologists

LCC Lincolnshire County Council

LCCAS Lincolnshire County Council Archaeology Section

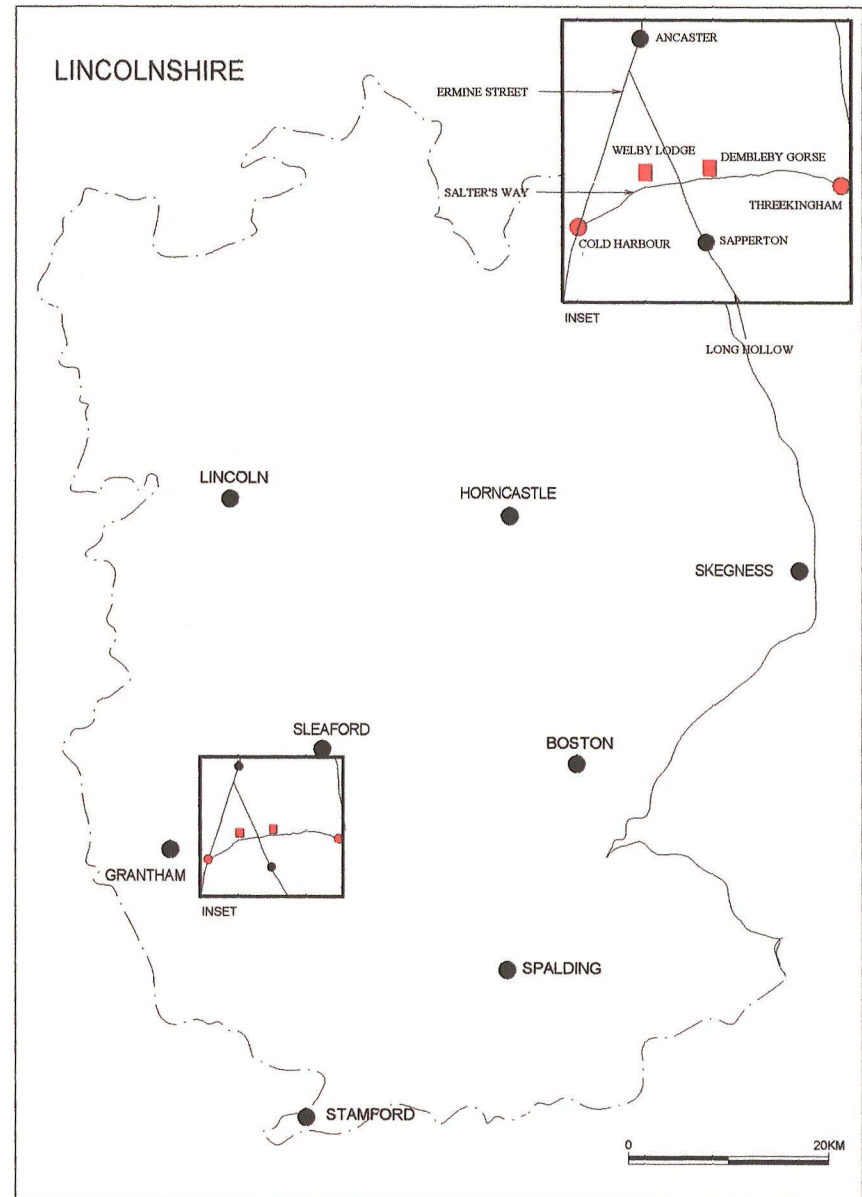


Figure 1: General location plan

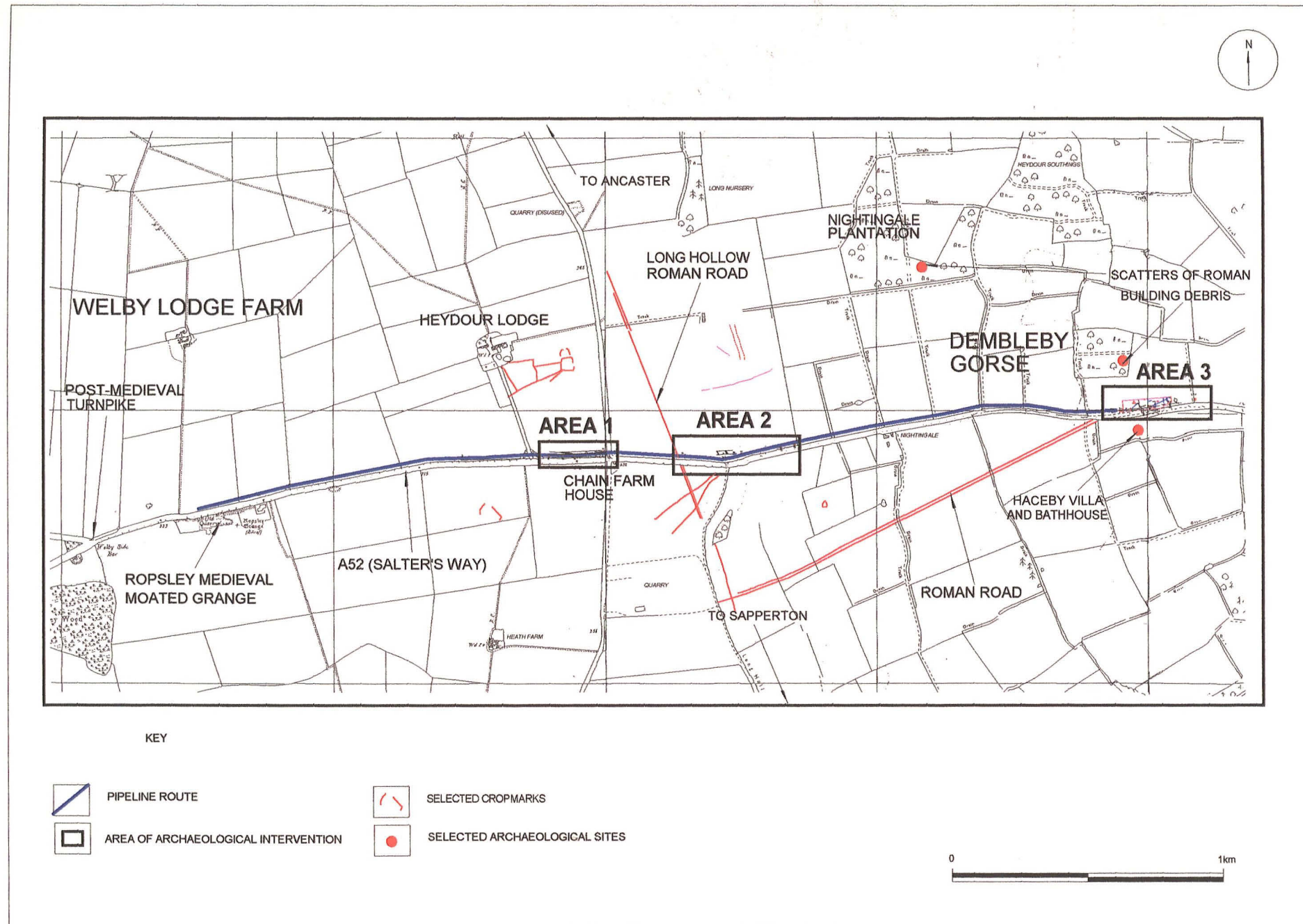
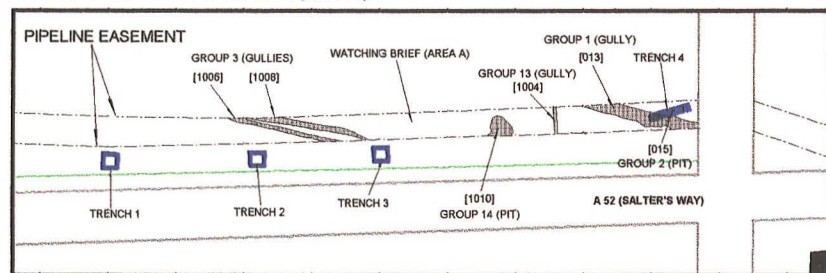








Figure 2: Area of investigation and selected archaeological remains



WATCHING BRIEF AND EVALUATION (AREA 1)



KEY

-  ARCHAEOLOGICAL REMAINS
-  PIPELINE EASEMENT
-  EVALUATION TRENCH
-  CROPMARKS
-  HEDGEROW
-  BUILDING

WATCHING BRIEF AND EVALUATION (AREA 2)

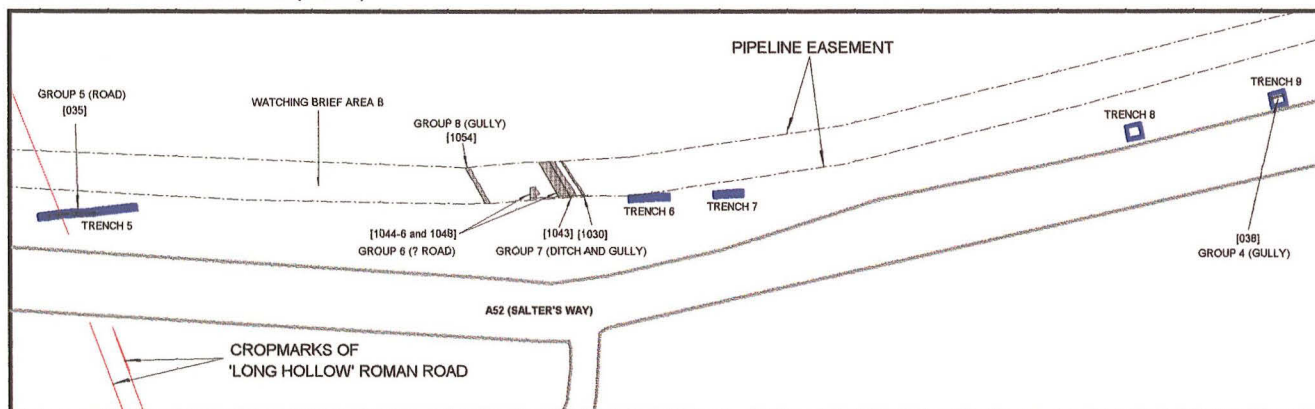


Figure 3: Plans showing the location of archaeological remains within Areas 1 and 2

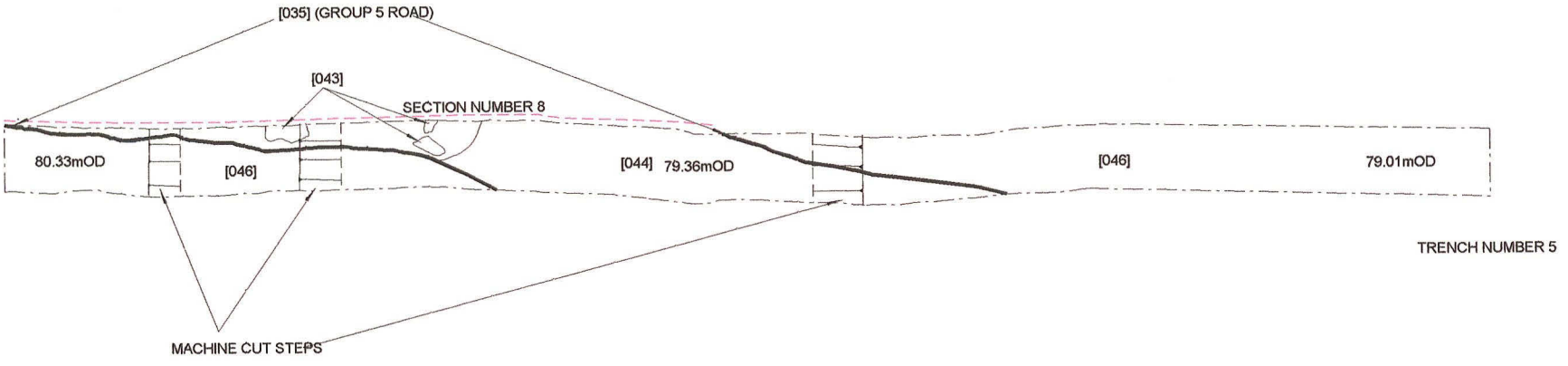
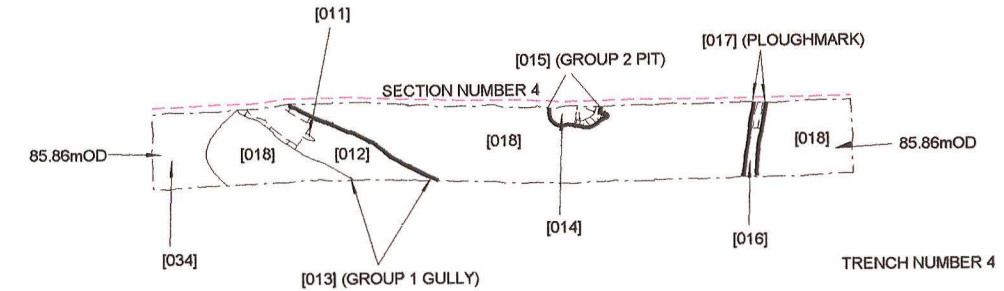
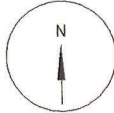


Figure 4: Plan of Trenches 4 and 5

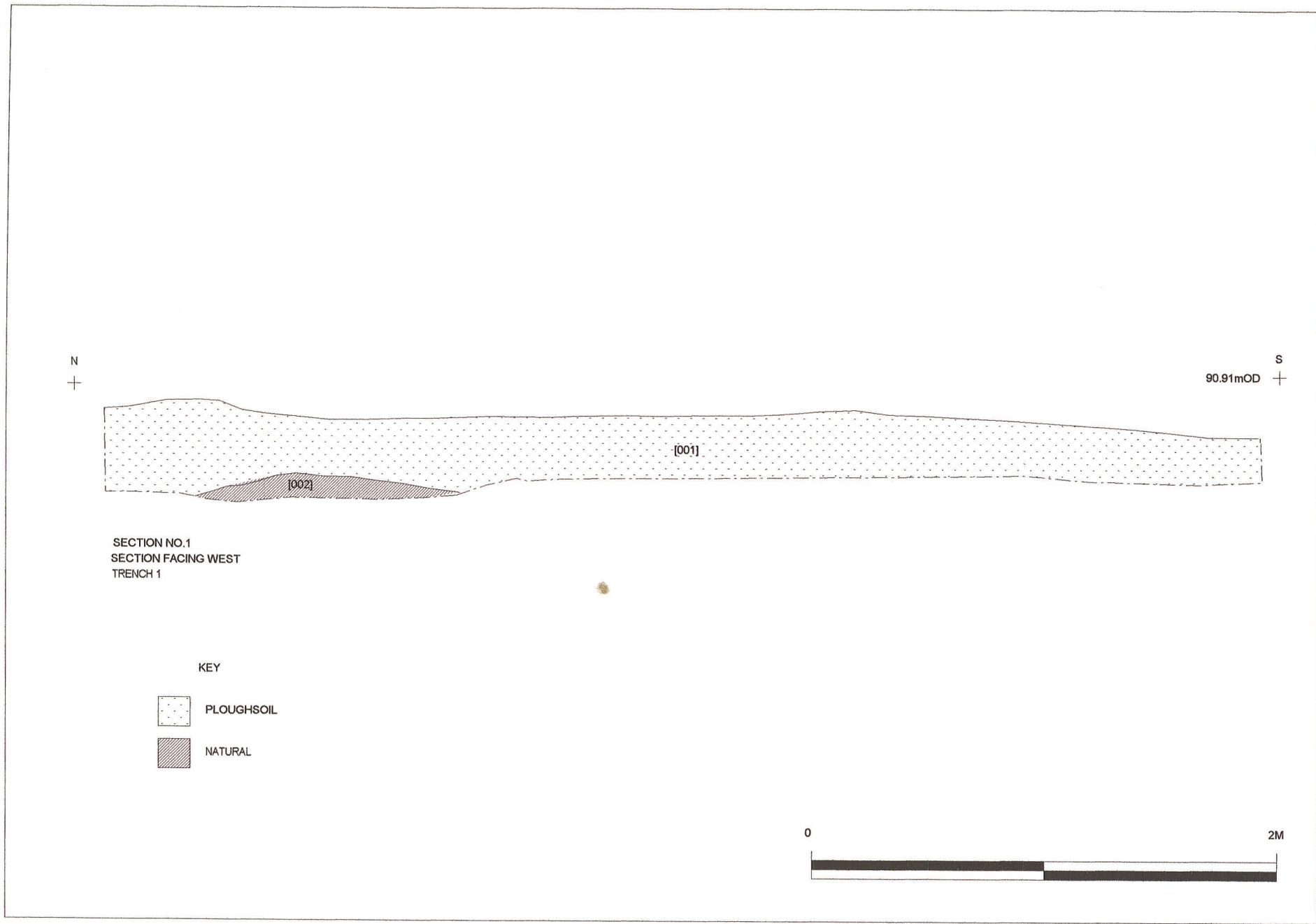


Figure 5: Trench 1, Section 1

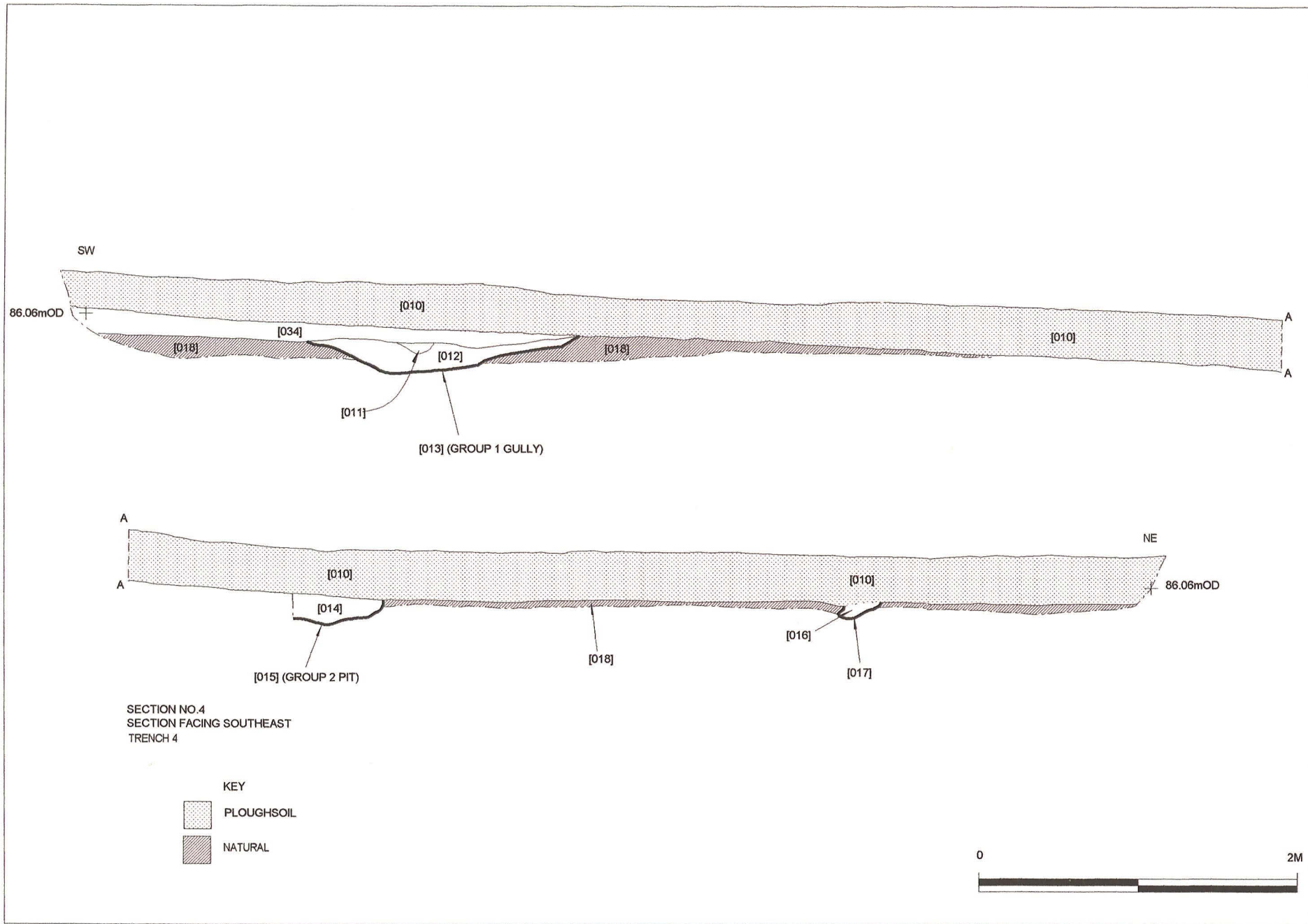
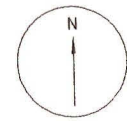
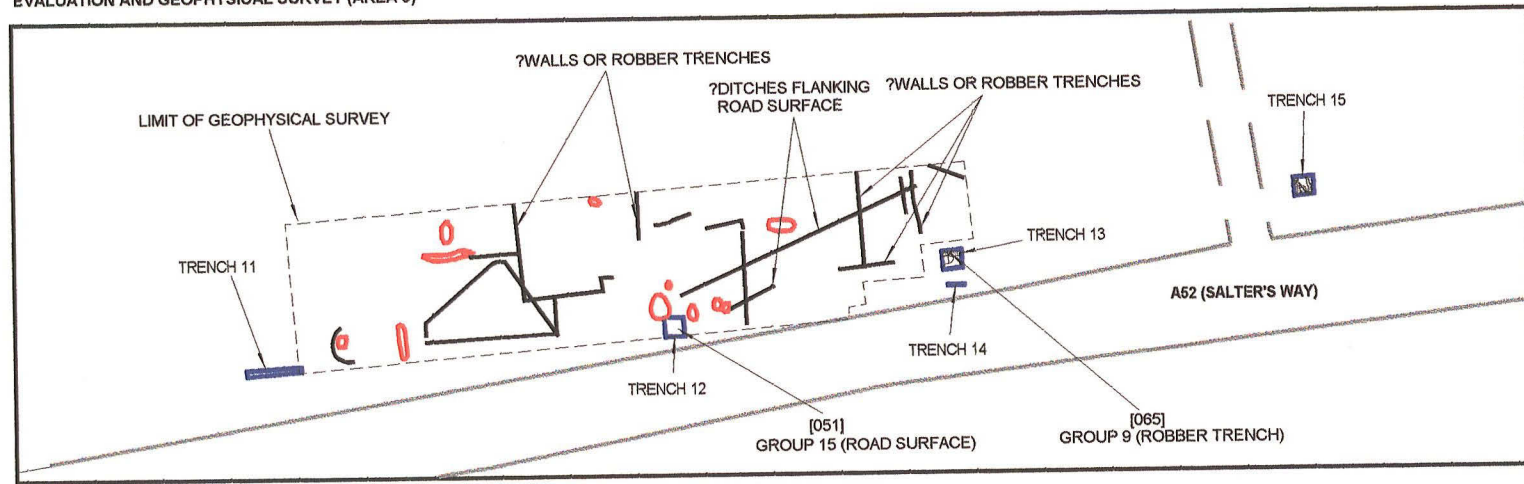


Figure 6: Trench 4, Section 4



EVALUATION AND GEOPHYSICAL SURVEY (AREA 3)



KEY




-  EVALUATION TRENCH
-  POSSIBLE PITS
-  WEAK LINEAR AND CURVILINEAR FEATURES



Figure 7: Plan showing location of archaeological remains within Area 3

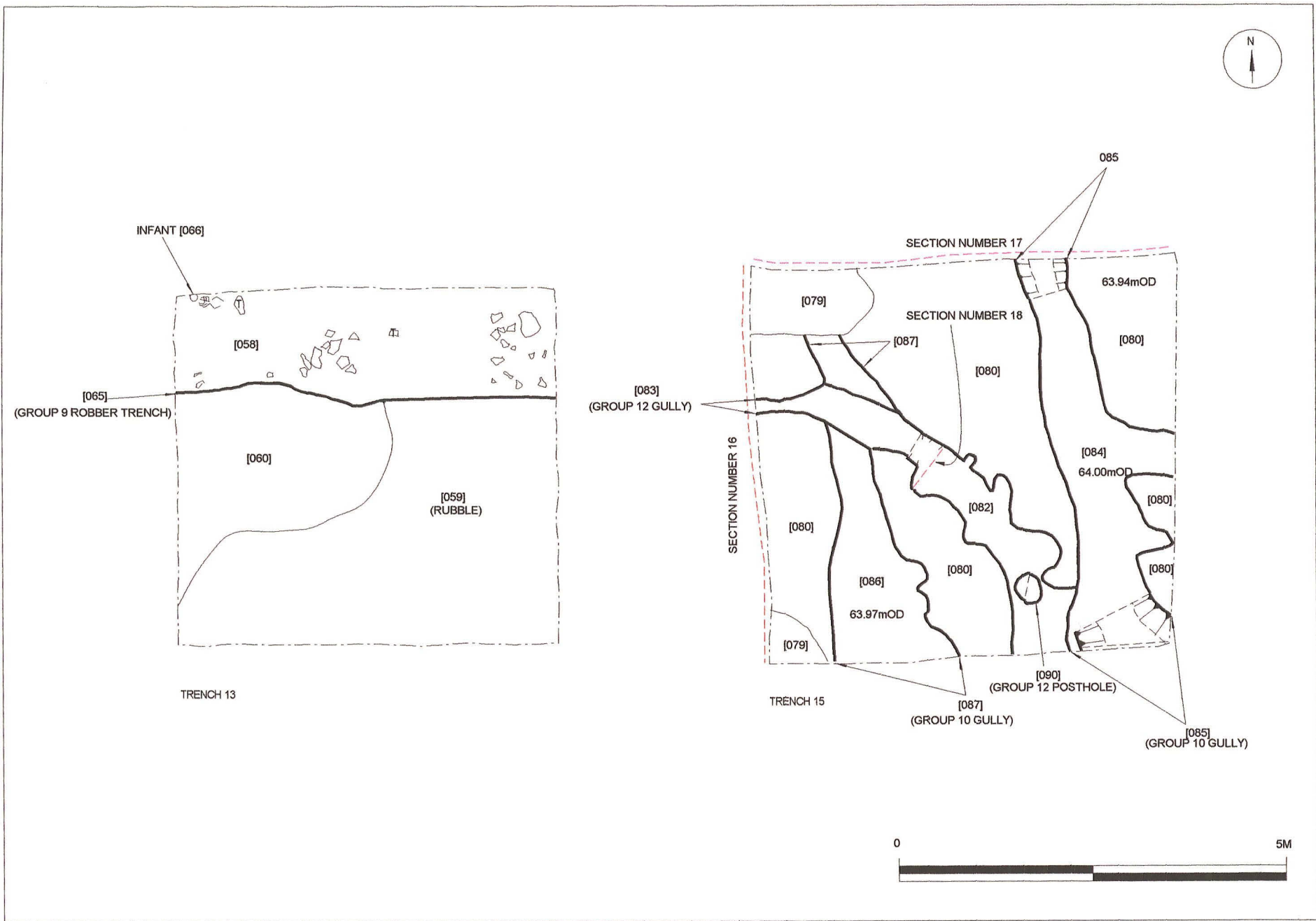


Figure 8: Plan of Trenches 13 and 15

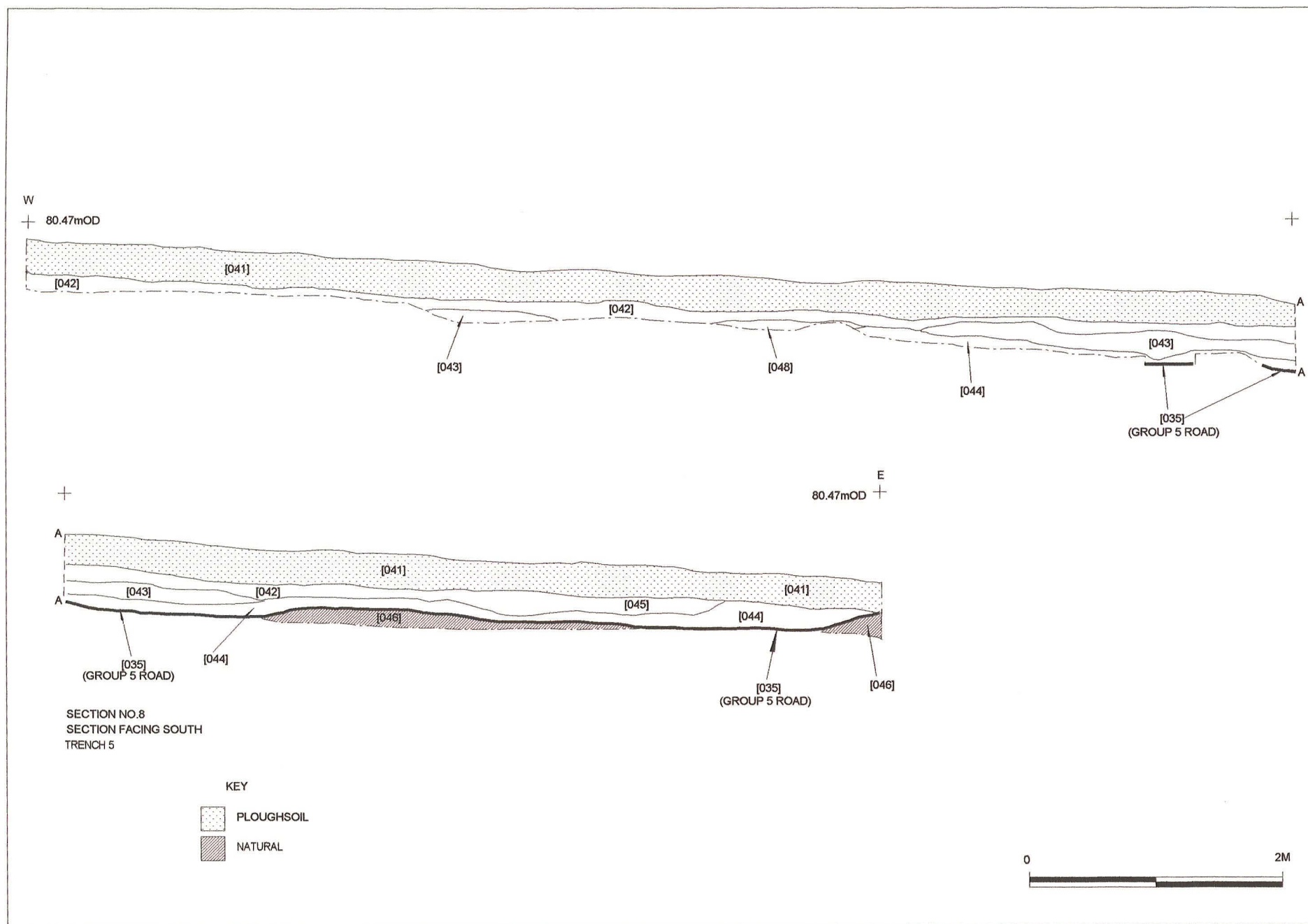


Figure 9: Trench 5, Section 8

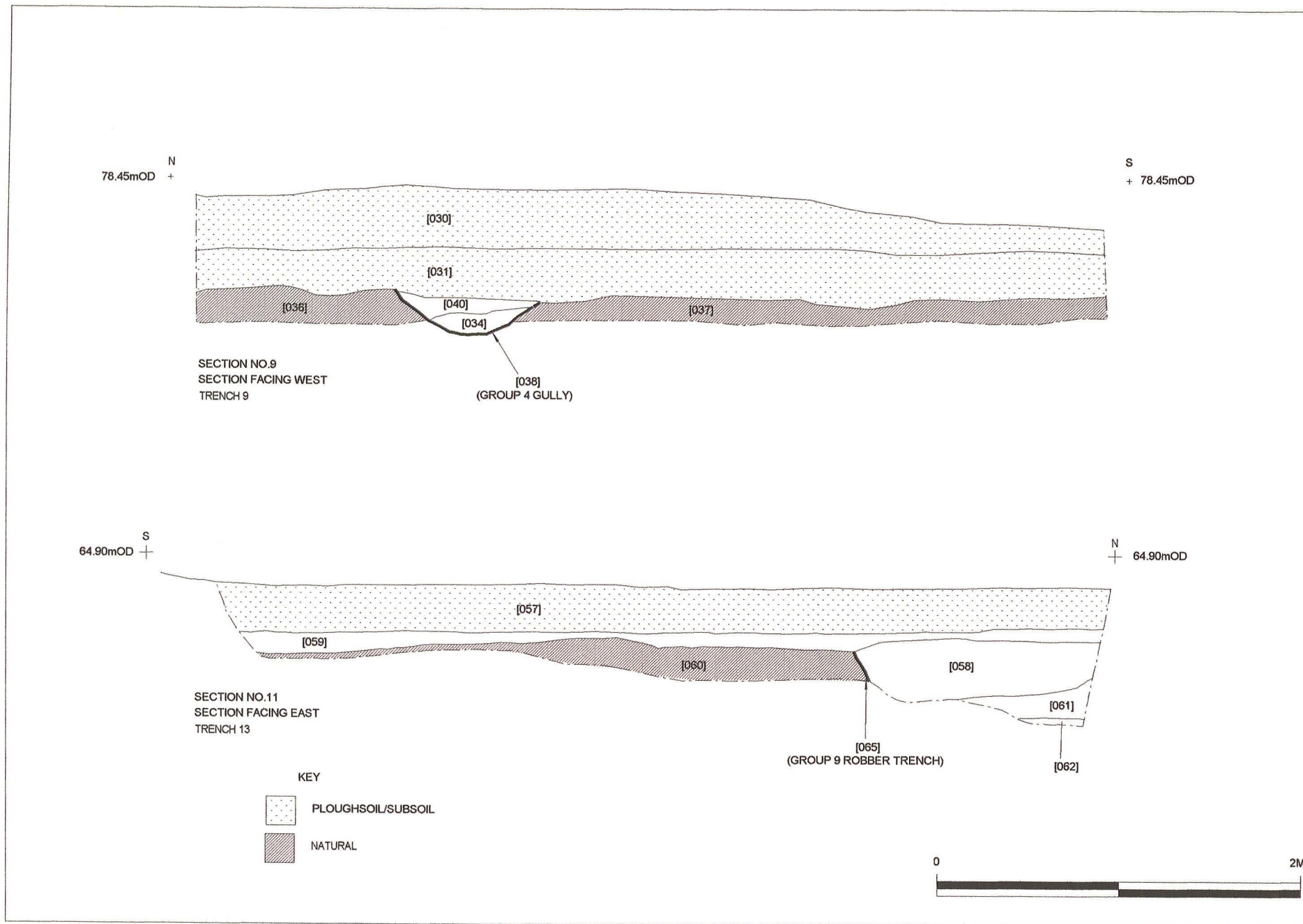
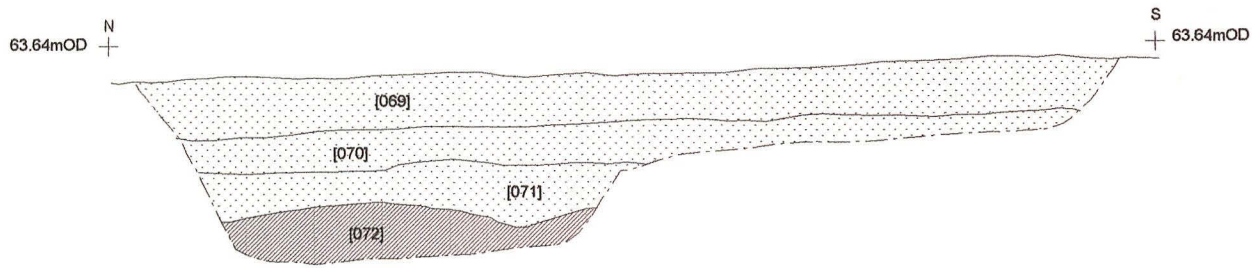
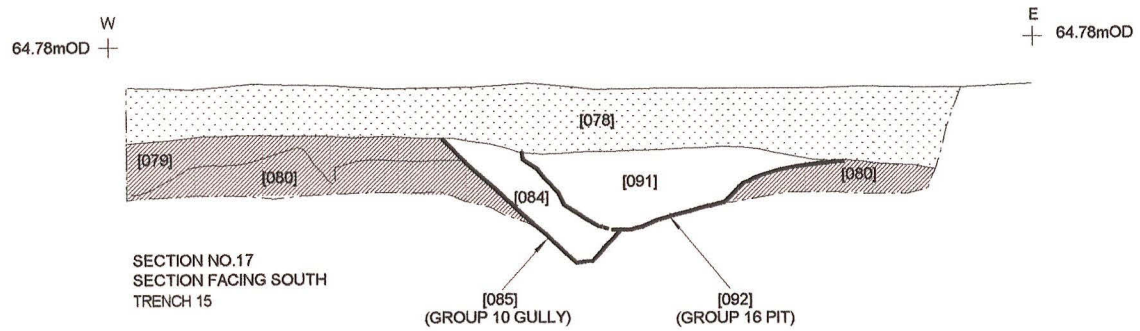


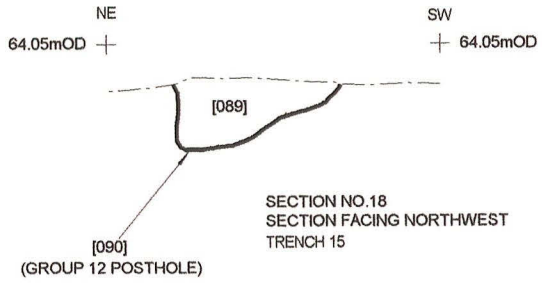
Figure 10: Trenches 9 and 13, Sections 9 and 11



SECTION NO.15
SECTION FACING WEST
TRENCH 14



SECTION NO.17
SECTION FACING SOUTH
TRENCH 15



SECTION NO.18
SECTION FACING NORTHWEST
TRENCH 15

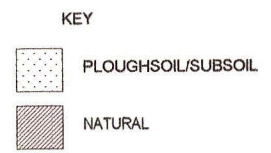


Figure 11: Trenches 14 and 15, Sections 15, 17 and 18



◀ Plate 1: General view of the pipeline route, looking eastwards into the Long Hollow valley and beyond to the Haceby villa site. Trench 5, containing the remains of the Long Hollow Roman road, appears in the foreground.

▼ Plate 2: Opening Trench 3 on the site of a known prehistoric and Romano-British finds scatter, looking eastwards. The hedge (right) marks the course of the A52 (Salter's Way).





◀ Plate 3: Trench 4, looking east, showing the alignment of an undated northwest-southeast orientated gully [013]. This feature was exposed in greater detail during the watching brief (Plate 4)

▼ Plate 4: View of the pipeline easement in Area 1, showing full extent of gully [013] re-numbered as [1001]. The low trees to the right of centre (far distance) mark the position of Heydour Lodge Farm and a known cropmark complex.



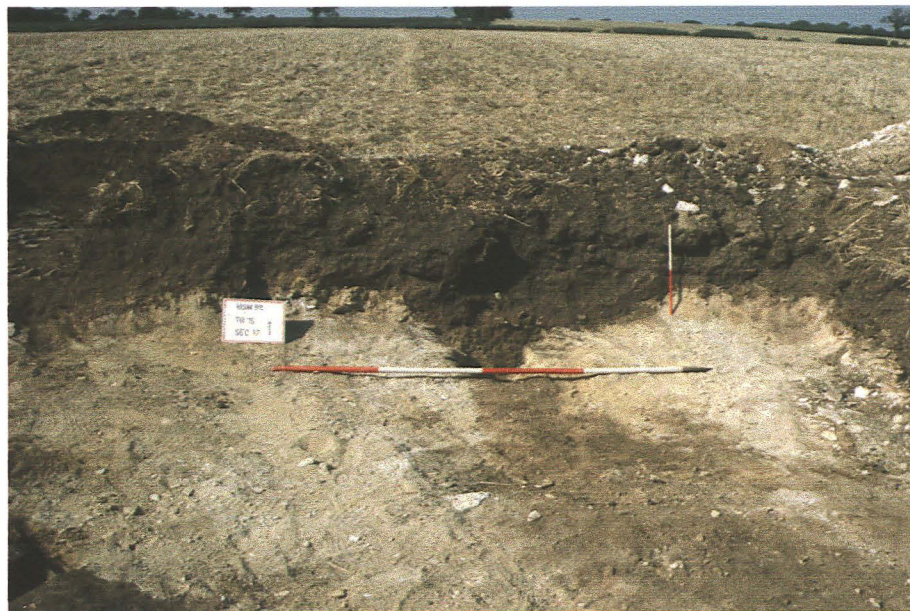


Plate 5: Trench 15, looking north, showing probable prehistoric gully [085] continuing into the near ground and related features (bottom left).



Plate 6: Trench 13, looking north, showing infant burial [066] and surrounding limestone rubble.
Note that the burial has a supine posture with legs akimbo.



Plate 7: Trench 13, looking west, showing the full extent of robber trench [065] as marked by the denser concentrations of limestone rubble.

Appendix 1

Specification for Work, By Archaeological Project Services

1 SUMMARY

- 1.1 *Anglian Water Ltd intend carrying out works in connection with the Aswarby to Harrowby Trunk Main Replacement scheme. Following recommendation from the Archaeological Officer, Lincolnshire County Council, a programme of archaeological works is required, in order to evaluate the archaeological potential of selected sections of the pipeline. This document comprises a project specification for the archaeological works.*
- 1.2 *The investigation follows the line of the A52 Grantham to Boston road, Heydour, Lincolnshire. Previous archaeological work along the route has indicated the presence of a number of prehistoric sites, dating from the mesolithic period. Notably, archaeological fieldwalking has identified a concentration of prehistoric flints in the central part of the evaluation area. The A52 road is suggested to be a Roman road. A second Roman road crosses the A52 and has been identified on aerial photographs. A number of Roman settlements have been identified in the area, including a Roman villa adjacent to the intended route, at Haceby. A medieval site, Ropsley Grange and post-medieval toll-house are located at the western end of the route.*
- 1.3 *The evaluation will consist of archaeological trial trenches and test pits. Any archaeological features present will be recorded in writing, graphically and photographically*
- 1.4 *A report will be prepared on completion of the fieldwork. This report will consist of a description and interpretation of all archaeological features recorded. This will be supported by appropriate illustrations and photographs.*

2 INTRODUCTION

- 2.1 *An archaeological evaluation is defined as 'a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, and relative quality; and it enables an assessment of their worth in a local, regional, national or international context as appropriate' (IFA 1994, 1).*
 - 2.1.1 The document contains the following parts:
 - 2.1.2 Overview
 - 2.1.3 The archaeological and natural setting

2.1.4 Stages of work and methodologies to be used

2.1.5 List of specialists

2.1.6 Programme of works and staffing structure of the project

3 SITE DESCRIPTION

3.1 The evaluation area is located approximately 3km south of the hamlet of Heydour and 3km north of the village of Ropsley, in the district of South Kesteven, Lincolnshire. The site extends for a distance of approximately 3km between national grid references SK 985 367 and TF 017 370, following the northern side of the A52 Grantham to Boston road which, in this area is known as *Salter's Way*.

4 SOILS AND TOPOGRAPHY

4.1 The evaluation area traverses several soil types. The western part of the route traverses brown rendzinas of the Elmton I and Marcham Associations (Hodge *et. al.* 1984, 242, 179). Further east, soils are of the Ragdale Association, typically pelo-stagnogley soils, before traversing Aswarby Association soils, fine loamy gleyic brown calcareous earths (*ibid.*, 293, 99). Drift geology is restricted to an area of Boulder Clay west of Haceby Lodge and glacial sand and gravel along the bottom of Long Hollow. These overlie a solid geology of Lincolnshire limestone (GSGB 1972).

4.2 The ground is essentially flat, with the exception of a small section approximately halfway along the route, where the line of the pipe crosses a natural dip, known as *Long Hollow*. The height varies between approximately 60m and 100m OD.

5 ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

5.1 The site lies within an area of considerable archaeological interest.

5.2 A previous desk top assessment and fieldwalking survey by Archaeological Project Services has identified sites and artefacts ranging from the mesolithic to post-medieval periods (Cope-Faulkner 1998). A total of nineteen sites were identified in the desktop assessment and fieldwalking (*ibid.*, table 1).

5.3 A scatter of Mesolithic flint tools was located in *Long Hollow*, on the south side of the A52 road (*ibid.*, site 18). Neolithic and Bronze Age stone tools have been recorded in the parish of Ropsley on a number of occasions. A cluster is recorded south of the A52 road (*ibid.*, site 17). A complex of cropmarks.

characteristic of the Iron Age, is located north of the evaluation area, at Heydour Lodge Farm (*ibid*, site 8).

- 5.4 Two major roads traversed the evaluation area during the Roman period. The main A52 Grantham to Boston road is suggested to be a Romanised trackway (Margary 1973, 234). This road is often referred to as the *Salter's Way*. A north to south road, known as *King Street* traverses the evaluation area, at *Long Hollow* (*ibid*, site 15). This road led north to a small Roman town at Ancaster, approximately 7km north of the evaluation area (Margary 1973, 232). Three Roman buildings are located along the line of the evaluation. A Roman villa, at Hacey, is located at the eastern end of the area (*ibid*, site 12). A concentration of Roman building debris (*ibid*, site 13), is located 250m north of the Hacey villa. A third Roman building was located within Nightingale Plantation, approximately 400m north of the evaluation area (*ibid* site 11).
- 5.5 The names Heydour and Ropsley are Old English in origin and mean 'the high door' and 'wood clearing' respectively (Ekwall 1974). Hacey and Braceby are derived from the Scandinavian *byr*, meaning homestead, with a personal name as the stem.
- 5.6 King Richard I granted land in Ropsley to Vaudey Abbey for a grange (Thompson 1955, 17). The grange was situated on the south side of the A52 road, at the western end of the evaluation area (*ibid*, site 7).

6 AIMS AND OBJECTIVES

- 6.1 The objectives of the work will be to:
- 6.1.1 Establish the type of archaeological activity that may be present along the site.
 - 6.1.2 Determine the likely extent of archaeological activity present along the site.
 - 6.1.3 Determine the spatial arrangement of the archaeological features present along the site.
 - 6.1.4 Determine the way in which the archaeological features identified fits into the pattern of occupation and land-use in the surrounding landscape.
 - 6.1.5 Determine the function of the archaeological features present along the site.

- 6.1.6 Determine the date and function of the archaeological features present along the site

7 **TRIAL TRENCHES**

- 7.1 Trial trenching enables the *in situ* determination of the sequence, date, nature, depth, environmental potential and density of archaeological features present.
- 7.2 The trial trenching will consist of the excavation of a fifteen evaluation trenches and test pits. The size and location of the trenches has been specified by the Archaeology Officer, Lincolnshire County Council. The location of the test pits and trial trenches are shown on Anglian Water Ltd. drawing nos. OC/1033/C/010 to OC/1033/C/014. Should archaeological deposits extend below 1.2m depth then the trench sides will be stepped in, or shored, as appropriate.
- 7.3 All work will be undertaken following statutory Health and Safety requirements in operation at the time of the evaluation.
- 7.4 The work will be undertaken according to the relevant codes of practice issued by the Institute of Field Archaeologists. Archaeological Project Services is an IFA registered archaeological organisation (number 21).
- 7.5 Excavation of the archaeological features exposed will only be undertaken as far as is required to determine their date, sequence, density and nature. Not all archaeological features exposed will be excavated. However, the evaluation will, as far as is reasonably practicable, determine the level of the natural deposits to ensure that the depth of the archaeological sequence present on the site is established.
- 7.6 Open trenches will be marked by hazard tape attached to road irons or similar poles. Subject to the consent of the Archaeological Officer, Lincolnshire County Council and following the appropriate recording, the trenches, particularly those of any depth, will be backfilled as soon as possible to minimise any health and safety risks.
- 7.7 Removal of the topsoil and overburden will be undertaken by mechanical excavator using a toothless ditching bucket, acting under archaeological supervision by Archaeological Project Services. Mechanical excavation will cease once archaeological features are encountered or natural deposits are reached, whichever occurs first. Any archaeological features present will be hand cleaned.
- 7.8 Investigation of the features will be undertaken only as far as required to

determine their date, form and function. Features will be half- or quarter-sectioned as appropriate.

- 7.9 The archaeological features encountered will be recorded on Archaeological Project Services pro-forma context record sheets and a unique identifying number (context) will be assigned to each layer.
- 7.10 All archaeological features present will be recorded in section and plan, at appropriate scales. Generally plans will be drawn at a scale of 1:20 and sections at a scale of 1:10.
- 7.11 A photographic record will be made. This will consist of black and white prints and colour slides. The photographic record will record:-
 - 7.11.1 the site before the commencement of field operations.
 - 7.11.2 the site during work to show specific stages of work, and the layout of the archaeology within individual trenches.
 - 7.11.3 individual features and, where appropriate, their sections.
 - 7.11.4 groups of features where their relationship is important.
 - 7.11.5 the site on completion of field work.
- 7.12 Should human remains be encountered, they will be left *in situ* prior to obtaining an appropriate Home Office. The local environmental health department and police will be informed.
- 7.13 Finds collected during the fieldwork will be bagged and labelled according to the individual deposit from which they were recovered.
- 7.14 The spoil generated during the evaluation will be mounded along the edges of the trial trenches with the top soil being kept separate from the other material excavated for subsequent backfilling.
- 7.15 The precise location of the trenches within the site and the location of site recording grid will be established by an EDM survey.

8 ENVIRONMENTAL ASSESSMENT

- 8.1 If deemed necessary, specialist advice will be obtained from an environmental archaeologist. The specialist will visit the site and will prepare a report detailing the nature of the environmental material present on the site and its

potential for additional analysis should further stages of archaeological work be required. The results of the specialists assessment will be incorporated into the final report.

9 POST-EXCAVATION AND REPORT

9.1 Stage 1

9.1.1 On completion of site operations, the records and schedules produced during the trial trenching will be checked and ordered to ensure that they form a uniform sequence constituting a level II archive. A stratigraphic matrix of the archaeological deposits and features present on the site will be prepared. All photographic material will be catalogued: the colour slides will be labelled and mounted on appropriate hangers and the black and white contact prints will be labelled, in both cases the labelling will refer to schedules identifying the subject/s photographed.

9.1.2 All finds recovered during the trial trenching will be washed, marked, bagged and labelled according to the individual deposit from which they were recovered. Any finds requiring specialist treatment and conservation will be sent to the Conservation Laboratory at the City and County Museum, Lincoln.

9.2 Stage 2

9.2.1 Detailed examination of the stratigraphic matrix to enable the determination of the various phases of activity on the site.

9.2.2 Finds will be sent to specialists for identification and dating.

9.3 Stage 3

9.3.1 On completion of stage 2, a report detailing the findings of the evaluation will be prepared. This will consist of:

9.3.1.1 A non-technical summary of the findings of the evaluation.

9.3.1.2 A description of the archaeological setting of the site with reference to the desk-top assessment.

9.3.1.3 Description of the topography and geology of the evaluation area

- 9.3.1.4 Description of the methodologies used during the evaluation and discussion of their effectiveness in the light of the findings of the investigation.
- 9.3.1.5 A text describing the findings of the evaluation.
- 9.3.1.6 Plans of the trench showing the archaeological features exposed. If a sequence of archaeological deposits is encountered, separate plans for each phase will be produced.
- 9.3.1.7 Sections of the archaeological features.
- 9.3.1.8 Interpretation of the archaeological features exposed and their context within the surrounding landscape.
- 9.3.1.9 Specialist reports on the finds from the site.
- 9.3.1.10 Appropriate photographs of specific archaeological features.
- 9.3.1.11 A consideration of the significance of the archaeological deposits encountered at local, regional and national level.

10 **ARCHIVE**

- 10.1 The documentation, finds, photographs and other records and materials generated during the evaluation will be sorted and ordered into the format acceptable to the City and County Museum, Lincoln. This sorting will be undertaken according to the document titled *Conditions for the Acceptance of Project Archives* for long term storage and curation.

11 **REPORT DEPOSITION**

- 11.1 Copies of the evaluation report will be sent to: the client, the Archaeological Officer, Lincolnshire County Council and Community Archaeologist, South Kesteven.

12 **PUBLICATION**

- 12.1 A report of the findings of the evaluation will be published in Heritage Lincolnshire's annual report and an article of appropriate content will be

submitted for inclusion in the journal of the Society for Lincolnshire History and Archaeology. Notes or articles describing the results of the investigation will also be submitted for publication in the appropriate national journals: *Medieval Archaeology* and *Journal of the Medieval Settlement Research Group* for medieval and later remains, and *Britannia* for discoveries of Roman date.

13 **CURATORIAL MONITORING**

13.1 The project will be carried out in line with the recommendations given by the Archaeological Officer of Lincolnshire County Council. Seven days notice in writing will be given to the Archaeological Officer, prior to the commencement of the project, to enable appropriate monitoring arrangements to be made.

14 **VARIATIONS TO THE PROPOSED SCHEME OF WORKS**

14.1 Variations to the scheme of works will only be made following written confirmation from the Archaeological Officer, Lincolnshire County Council.

14.2 Should the Archaeological Officer require any additional investigation beyond the scope of the brief for works, or this specification, then the cost and duration of those supplementary examinations will be negotiated between the client and the contractor.

15 **SPECIALISTS TO BE USED DURING THE PROJECT**

15.1 The following organisations/persons will, in principal and if necessary, be used as subcontractors to provide the relevant specialist work and reports in respect of any objects or material recovered during the investigation that require their expert knowledge and input. Engagement of any particular specialist subcontractor is also dependent on their availability and ability to meet programming requirements.

<u>Task</u>	<u>Body to be undertaking the work</u>
Conservation	Conservation Laboratory, City and County Museum, Lincoln.
Pottery Analysis	Prehistoric: Dr D Knight, Trent and Peak Archaeological Trust Roman: B Davies, City of Lincoln Archaeological Unit. Lincoln.

	Anglo-Saxon: J Young, City of Lincoln Archaeological Unit, Lincoln.
	Medieval and later: H Healey, independent archaeologist
Flints	Dr. I. Brooks, Engineering Archaeological Services.
Other Artefacts	J Cowgill, independent specialist
Human Remains Analysis	R Gowland, Independent specialist
Animal Remains Analysis	Environmental Archaeology Consultancy
Environmental Analysis	Environmental Archaeology Consultancy
Radiocarbon dating	Beta Analytic Inc., Florida, USA
Dendrochronology dating	University of Sheffield Dendrochronology Laboratory

16 **PROGRAMME OF WORKS**

Refer to enclosure.

17 **BIBLIOGRAPHY**

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Appendix 2

Context Summary

CTX	TR	DESCRIPTION	GR	PH	DATE	INTERP
001	1	Firm, mid brown silty loam containing small rounded limestone fragments.		4		Ploughsoil.
002	1	Firm, yellowish orange sand containing frequent large angular limestones.		1		Natural geology.
003	1	Finds collected during sieving.				NA
004	2	Firm, mid brown silty loam containing occasional limestone fragments.		4		Ploughsoil.
005	2	Firm, yellowish orange sandy silt containing small to large limestones.		1		Natural geology.
006	2	Finds collected during sieving.				NA
007	3	Firm, mid brown silty loam containing moderate rounded limestone fragments and brick.		4		Ploughsoil.
008	3	Firm, light greyish white degraded limestone.		1		Natural geology.
009	3	Finds collected during sieving.				NA
010	4	Compact, dark greyish brown sandy silt containing limestones and occasional flints.		4		Ploughsoil.
011	4	Compact, mid red and dark reddish grey sandy silt.	1	2		Fill of [013].
012	4	Compact, mid brown sandy silt containing small limestones.	1	2		Fill of [013].
013	4	Linear cut with concave sides and base (0.8m wide x 0.3m deep).	1	2		Gully.
014	4	Compact, mid reddish brown sandy silt containing frequent small limestone fragments.	2	2		Fill of [015].
015	4	Sub-circular cut with irregular sides and concave base (0.4m wide x 0.2m deep).	2	2		Pit.
016	4	Compact, dark greyish-brown sandy silt containing frequent small limestone fragments.		4		Fill of [017].
017	4	Linear cut with steep sides and a flat base (0.22m wide x 0.07m deep).		4		Ploughmark.
018	4	Loose, limestone fragments in a white sandy matrix.		1		Natural geology.
019	8	Finds collected from sieving.				NA
020	8	Moderately compact, mid brownish grey silty sand containing limestone fragments and flint.		4		Ploughsoil.
021	2	Finds collected from sieving.			Roman and post-Roman	

022	3	Finds collected from sieving.				NA
023	3	Firm, mid brown silty loam containing moderate rounded limestone fragments and brick.		4		Ploughsoil.
024	2	Finds collected from ploughsoil prior to machining.			?Roman	NA
025	9	Finds collected from sieving.			Roman	NA
026	6	Moderately compact, mid greyish brown silty sand containing frequent limestone fragments.		4		Ploughsoil.
027	6	Loose, yellowish brown silty sand containing large limestone fragments.		1		Natural geology.
028	7	Hard, mid brownish grey silty sand containing limestone fragments.		4		Ploughsoil.
029	7	Loose, reddish brown silty sand containing limestone fragments.		1		Natural geology.
030	9	Firm, mid brown silty loam containing limestone fragments.		4		Ploughsoil.
031	9	Firm, yellowish orange sand containing limestone fragments.		4		Subsoil.
032	8	Loose, white limestone containing occasional patch of silty sand.		1		Natural geology.
033	8	Loose, reddish brown silty sand containing occasional flint and moderate limestones.		1		Natural geology.
034	4	Compact, mid reddish brown sandy clayey silt containing frequent small limestone fragments.		4		Subsoil.
035	5	Linear cut with concave sides and base (6m wide x 0.5m deep).	5	3		Sunken track.
036	9	Loose, greyish yellow sand containing occasional gravel.		1		Natural geology.
037	9	Loose, orange yellow sand containing occasional limestone fragments.		1		Natural geology.
038	9	Linear cut with concave sides and base (0.6m wide x 0.4m deep).	4	2		Gully
039	9	Firm, orange brown clay containing occasional organic material and flints.	4	2		Fill of [038].
040	9	Loose, greyish white silty sand containing occasional flints.	4	2		Fill of [038].
041	5	Compact, mid dark greyish brown clayey sandy silt containing frequent limestone fragments and flints.		4		Ploughsoil.
042	5	Moderately compact, mid brown clayey sandy silt with some brownish white mottling, containing frequent small limestones.	5	3		Fill of [035].
043	5	Compact, white limestones and crushed limestone.	5	3		Fill of [035].

044	5	Firm, dark greyish brown clayey sandy silt containing moderate limestone fragments and charcoal flecks.	5	3		Fill of [035].
045	5	Compact, mid olive brown clay.	5	3		Fill of [035].
046	5	Limestone fragments in a sandy matrix.		1		Natural geology.
047	11	Firm, dark brown sandy clay containing limestone fragments.		4		Ploughsoil.
048	11	Stiff, mid yellowish olive brown sandy clay containing frequent small limestone fragments.		1		Natural geology.
049	11	Firm, mid yellow and light bluish grey clayey sand containing moderate grits.		4		Natural geology.
050	12	Firm, dark brown sandy clay containing frequent limestone fragments.		4		Ploughsoil.
051	12	Firm, mid yellowish brown sandy clay containing frequent limestone, occasional charcoal flecks and burnt clay fragments.	15	3	2-4 AD	Surface.
052	12	Firm, light yellowish brown sandy clay containing patches of mid grey and frequent grits.		1		Natural geology.
053	WB	Same as [1054]	8	2		Gully.
054	WB	Loose, medium brown silt containing occasional small limestone fragments.		4		Ploughsoil.
055	WB	Same as [1053]	8	2		Fill of [053].
056	WB	Same as [1052]	8	2		Fill of [053].
057	13	Firm, dark brown sandy silty clay containing frequent limestones.		4	M3+ AD	Ploughsoil.
058	13	Compact, dark brown clayey sand with light yellowish brown and dark grey mottling containing frequent limestones, occasional charcoal, CBM and pink mortar.	9	3		Fill of [065].
059	13	Compact, mid brown clayey sandy silt containing frequent limestones.		3		Rubble.
060	13	Soft, mid reddish brown clayey silty sand containing moderate small sub-angular flints and charcoal flecks.		1		Natural geology.
061	13	Soft, dark greyish brown silty sand and ash containing frequent grits, occasional CBM and limestone fragments.	9	3	4 AD	Fill of [065].
062	13	Soft, light yellowish brown medium sand containing occasional mid brown mottling.	9	3	3+ AD	Fill of [065].
063	13	Finds collected during sieving.			L3 AD	NA
064		Not used.				NA
065	13	Linear cut with concave sides and a flat base (1.3m x 0.45m deep).	9	3		Robber trench.
066	13	Infant skeleton.	9	3		Burial

067	14	Finds collected during sieving.			2 AD and post-Roman	NA
068	15	Finds collected during sieving.			3+ AD and post-Roman	NA
069	14	Firm, mid brown clayey sandy silt containing frequent limestone fragments.		4		Ploughsoil.
070	14	Firm, mid brown clayey sandy silt containing occasional small limestone fragments.		4		Subsoil.
071	14	Firm, mid brown clayey sandy silt containing frequent limestone fragments.		4		Subsoil.
072	14	Firm, white limestone within an occasional dark brown clayey sandy silt matrix.		1		Natural geology.
073		Not used.				NA
074		Not used.				NA
075		Not used.				NA
076		Not used.				NA
077		Not used.				NA
078	15	Moderate, mid brown coarse silt containing occasional limestones.		4		Ploughsoil.
079	15	Compact, greyish white limestone.		1		Natural geology.
080	15	Loose, yellowish white sand.		1		Natural geology.
081	15	Loose, reddish brown silty sand containing occasional small limestone fragments (same as 082).	12	2		Fill of [083].
082	15	Friable, mid reddish brown silty sand containing frequent grits (same as 081).	12	2		Fill of [083].
083	15	Curvilinear cut with a vertical north-eastern side, a gradual south-western side and a flat base (0.6m wide x 0.2m deep).	12	2		Gully.
084	15	Friable, mid reddish brown silty sand containing frequent grits and moderate limestone fragments.		2		Fill of [085].
085	15	Linear cut with sloping sides and a blunt tapered point (0.8m wide x 0.5m deep).	10	2		Gully.
086	15	Friable, mid reddish brown silty sand containing frequent grits and limestone fragments.	10	2		Fill of [087].
087	15	Unexcavated linear cut (1.3m wide) following a north-south orientation.	10	2		Gully.
088	15	Soft, dark blackish grey organic material.	12	2		Fill of [090].
089	15	Moderately compact, dark greyish brown silty sand containing one fragment of limestone.	12	2		Fill of [090].

090	15	Sub-circular cut with vertical sides and concave base.	12	2		Post-hole.
091	15	Friable, mid greyish brown clayey sandy silt containing moderate small limestone fragments.	16	5	Post-medieval	Fill of [092].
092	15	Linear cut with uneven sides and base (1.4m wide x 0.4m deep).	16	5		Pit.
093	14	Finds collected whilst metal detecting spoil heap.			3-4 AD	NA
094	14	Finds collected from ploughsoil.			4AD	NA
095	13	Finds collected whilst metal detecting spoil heap.			4 AD CNII	NA
998	WB	Dark brown silty clay.		4		Ploughsoil.
999	WB	Orangish-white sandy limestone.		1		Natural geology.
1000	WB	Light brown silty sand with limestone.	1	2		Fill of [1001]
1001	WB	Linear cut with shallow sides and irregular base (4.3m wide x 0.3m deep)	1	2		Gully.
1002	WB	Not used.				NA
1003	WB	Mid brown silty sand.	13	2		Fill of [1004]
1004	WB	Linear cut with concave sides and base (1m wide x 0.5m deep).	13	2		Gully.
1005	WB	Mid brown silty sand.				Fill of [1006].
1006	WB	Linear cut with concave sides and base (2.5m wide x 0.3m deep).	3	2		Gully.
1007	WB	Firm, mid brown silty sand.	3	2		Fill of [1008].
1008	WB	Linear cut with concave sides and base (2.5m wide x 0.3m deep).	3	2		Gully.
1009	WB	Orange sand.	14	2		Fill of [1010].
1010	WB	Circular cut with steep sides and concave base (7m diameter and 1.2m deep).	14	2		Pit.
1011	WB	Dark grey-brown sandy clay.		4		Ploughsoil.
1012	WB	Same as [1051].		2		Fill of [1015].
1013	WB	Same as [1052].		2		Fill of [1015].
1014	WB	Same as [1053].		2		Fill of [1015].
1015	WB	Same as [1054].		2		Ditch.
1016	WB	Mid brown silty sandy clay.		4		Subsoil.
1017	WB	Dark grey-brown clayey sand with limestone.		4		Land-drain
1018	WB	Not used.				NA
1019	WB	Not used.				NA
1020	WB	Same as [1048]	6	2		Surface.

1021	WB	Linear cut with gradual sides (3.7m wide x 0.1m deep).	6	2		Sunken road.
1022	WB	Not used.				NA
1023	WB	Not used.				NA
1024	WB	Not used.				NA
1025	WB	Not used.				NA
1026	WB	Linear cut with shallow sides and concave base (0.1m wide) not excavated.	6	2		?Wheel rut.
1027	WB	Mid brown silty sand.	6	2		Fill of [1026].
1028	WB	Linear cut with shallow sides and concave base (0.1m wide) not excavated.	6	2		?Wheel rut.
1029	WB	Mid brown silty sand.	6	2		Fill of [1028].
1030	WB	Linear cut with shallow sides and concave base (0.1m wide) not excavated.	6	2		?Wheel rut.
1031	WB	Mid brown silty sand.	6	2		Fill of [1030].
1032	WB	Linear cut with shallow sides and concave base (0.1m wide) not excavated.	6	2		?Wheel rut.
1033	WB	Mid brown silty sand.	6	2		Fill of [1032].
1034	WB	Dark grey-brown sandy clay.		4		Ploughsoil.
1035	WB	Dark grey-brown sandy clay.		4		Subsoil.
1036	WB	Dark grey-brown sandy clay.		4		Ploughsoil.
1037	WB	Linear cut (0.2m deep x 0.1m wide).		4		?Wheel rut.
1038	WB	Yellow-brown silty sand.		4		Fill of [1037].
1039	WB	Dark grey-brown sandy clay.		4		Subsoil.
1040	WB	Mid brown sandy clay.	7	2		Fill of [1043].
1041	WB	Mid yellow-brown sandy clay.	7	2		Fill of [1043].
1042	WB	Mid yellow-brown sandy clay.	7	2		Fill of [1043].
1043	WB	Linear cut with concave sides and base (2.9m wide x 0.5m deep).	7	2		Ditch.
1044	WB	Mid yellow-brown silty sand.	6	2		?Surface.
1045	WB	Mid yellow-brown silty sand.	6	2		?Surface.
1046	WB	Mid yellow-brown silty sand.	6	2		?Surface.
1047	WB	Mid yellow-brown silty sand.	6	2		Surface.
1048	WB	Mid yellow-brown silty sand.	6	2		?Surface.
1049	WB	Mid yellow-brown silty sand.	6	2		Subsoil.
1050	WB	Mid yellow-brown silty sand.	6	2		Subsoil.
1051	WB	Dark brown silty sand.	8	2		Fill of [1054].
1052	WB	Light yellow-brown silty sand.	8	2		Fill of [1054].

1053	WB	Dark brown silty sand.	8	2		Fill of [1054].
1054	WB	Linear cut with gradual sides and concave base (3.3m wide x 1m deep)	8	2		Gully.

Appendix 3

The Finds, By Gary Taylor MA

Range

The range of material is detailed in the tables.

Table 1: Glass, stone and pottery

Context	Description	Context Date
003	1 clay pipe stem, 18 th cent.	?18 th cent.
009	1 creamware, 18th-19th cent. 1 blue and white transfer printed tableware, 19 th cent. 1 white glazed tableware 1 salt glazed drain pipe, 19th-20th cent. 5 vessel glass, clear, 1 patinated	19th-20th cent.
019	1 vessel glass, brown	late 19th-20th cent.
021	1 burnt limestone 1 vessel glass	post-medieval
022	1 stoneware flagon, early 20 th cent. 1 vessel glass, brown, 19 th -20th cent.	19th-20th cent.
023	1 machine-made pot, burnt	18th-20th cent.
024	1 rotary quern fragment	?Roman
025	1 flint debitage, prehistoric 1 flint knife blade tip, broken, late neolithic-early Bronze Age 1 clay pipe stem, 18 th cent.	18 th cent.
057	1 slate 1 glass, window 1 glass, plain angular ribbon handle of bottle	Roman
061	1 slate 1 jet bead, 2 perforations	Roman
063	2 slate 1 stone roof tile 1 clear glass, heat distorted 2 vessel glass, brown, incl. bottle top	20 th cent.
067	5 slate	Roman

068	2 slate 1 ?bakelite	20 th cent.
084	1 flint butt end of small blade	Prehistoric
093	1 baked clay spindle whorl	Roman
1009	7 burnt clay fragments	
1040	1 clay pipe bowl, Oswald type G9 variant	late 17 th -early 18 th cent.

Part of the handle of a Roman bottle was recovered from [057]. Although none of the body of the vessel was recovered, limiting identification, such plain ribbon handles were applied to various types of cylindrical bottles, particularly funnel mouthed examples, dating from the late 2nd to 4th centuries. Previous examples of such bottles have occasionally been found in graves (Price and Cottam 1998, 203-5).

Table 2: Metalwork

Context	Description	Context Date
003	1 iron wire/nail shaft	
019	1 iron rod, rectangular section, ?cast	?post-medieval
023	1 iron ring, ?cast	?post-medieval
025	1 iron fragment, small, amorphous	
061	1 iron spike/nail head 1 iron wire/nail	
062	1 iron blade/flattened strip 1 iron hook	
068	2 iron nails 1 iron slag (smithing)	
078	1 iron flat strip	
091	1 iron sheet, perforated with ?socket hole, cast	post-medieval
093	1 lead amorphous lump	
094	1 iron hexagonal nut and bolt, red paint	20 th cent.
095	1 copper alloy coin, Constantius II (337-61) 2 cut lead sheets	c. 348-60

The single coin is a Fel Temp Reparatio (return of happy times) issue of Constantius II. Coins with this reverse legend were introduced in 348 to coincide with the eleven hundredth

anniversary of the city of Rome (Casey 1980, 22).

Table 3: Snails and other shells

Context	Species	Remarks
003	2 oyster	small fragments
025	1 snail, ? <i>Helix nemoralis</i>	small
057	1 oyster	medium size complete shell
063	1 oyster 1 snail, ? <i>Helix nemoralis</i>	small fragment small complete shell
067	1 snail, <i>Helix nemoralis</i>	large complete shell
068	1 oyster	small fragment
078	3 snails, <i>Helix nemoralis</i> 33 snails, <i>Helix nemoralis</i>	2 small, 1 large 2 large, 4 medium, 27 small
1009	21 snails, <i>Helix nemoralis</i>	16 large, 4 medium, 1 small

All of the clearly identifiable snail shells are of the banded snail, *Helix nemoralis*. This species has a very varied habitat, including woods, hedges, scrub, grassland and dunes (Kerney and Cameron 1979, 204).

References

Casey, P.J., 1980 *Roman Coinage in Britain*, Shire Archaeology 12

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Appendix 4

The Animal Bone, By Paul Cope-Faulkner BA (Hons), AIFA

Introduction

Over 100 animal bones were retrieved during archaeological investigations along the route of a pipeline in Heydour. The bone was generally in very poor condition, being at the best chalky in nature. Due to this poor state of preservation, few of the animal bones are identifiable to species. A few examples were in fairly good condition, but considering these were from sieved ploughsoil contexts, they are likely to be more recent. The animal bone from stratified archaeological contexts included the robber trench backfills [061, 062], an undated gully [084] and a Romano-British pit [1009]. The full range of material is catalogued below.

Context	Species	Type	Notes
003	Pig Bird	Canine Unknown	
019	Unknown	Unknown	
020	Cattle sized	Tibia	fragmentary
021	Cattle sized Unknown Unknown	Unknown Unknown Unknown	
057	Cattle Sheep sized Sheep sized	Metacarpus Incisor Metatarsus	fragmentary, some rodent gnawing juvenile
061	Cattle sized Cattle sized Sheep sized Sheep sized Sheep sized Unknown	Mandible Rib Rib Rib Rib Unknown	3 fragments
062	Cattle sized Sheep sized Sheep sized Sheep sized	Unknown Skull Molar Unknown	2 fragments 2 fragments 2 fragments
063	Cattle sized Sheep sized Sheep sized Unknown	Rib Molar Unknown Unknown	3 fragments
067	Sheep Unknown	Molar Unknown	4 fragments
068	Sheep	Metacarpus	
078	Bird	limb bones	unidentifiable, possibly modern
084	Sheep sized Unknown Unknown	Molar Vertebra Unknown	possibly rabbit, modern possibly amphibian

1009

Cattle

Calcaneum, molars, ribs, vertebrae, tibia *etc.* with over 100 tiny fragments, representing a single beast

Sheep sized

Molar

Potential

There is little potential for an assemblage this size, especially when considering much of the material was from the modern ploughsoil. However, it may enhance the results of any future examinations of the Romano-British building complex.

Appendix 5

The Infant Remains, By Ed Lewis BA, MA

1. *Introduction*

Human infant skeletal remains were retrieved from evaluation trenches situated north of the A52 Grantham to Boston Road (Salter's Way), in proximity to a suspected Romano-British villa complex at Haceby, Lincolnshire (Cope-Faulkner 1998). The remains comprised a single, intact neonate skeleton [066] and additional disarticulated neonate remains from an associated context [062].

2. *Methodology*

Sexing

Sex determination of infant skeletal evidence is not possible with any degree of accuracy at the present time, because none of the standard markers for sexual dimorphism found in adults are present on, or within, pre-pubescent bone. Recent research by Saunders (1992) and Schutkowski (1993) has provided morphognostic markers for infant and juvenile sex determination. However, their work was conducted on modern, intact, pathological specimens. Given the fragmentary nature of the archaeological material from Heydour, sexing was not attempted.

Age at Death

The attribution of age at death in the subadult skeleton is relatively straightforward, with dental development, calcification and eruption of teeth, and development of the skeleton, including fusion of epiphyses, considered reliable indicators (Ubelaker 1987). Dental analysis of skeleton [066] suggests the individual died some time after childbirth and was not stillborn. It would appear that this individual was aged between neonate and *c.*2.5 months old at time of death

Pathology

The skeletal material was examined for pathological conditions and/or traumatic lesions. Chronic pathological lesions were not observed. It would appear likely that the cause of death was acute or soft tissue disease, trauma, or environmental factors, such as hypothermia and/or starvation.

3. *The Remains*

Skeletal identification and analyses followed guideline set out by Bass (1987). The minimum number of individuals (N4NI) is two.

Skeleton [066]

Preservation

Virtually complete human infant aligned WNW to ESE. Bones are fragile but of good preservation. Skull damaged, with the majority of the left parietal and frontal cranium, and left maxilla and mandible missing. Skeleton placed on back with skull (apparently) facing left. Arms either side of body (hand bones not retrieved/found). Legs flexed (akimbo). Foot bones not retrieved/found. No obvious grave cut or grave goods found. The burial was sealed by the backfill [062] of robber trench [065], which contained Roman pottery and animal bone.

Age at Death

Neonate to 2.5 months

Pathology

No discernible pathology.

Context [062]

Disarticulated skeletal material retrieved from section. Material comprised neonate/infant tibia shaft (left leg), and proximal end of fibula (left leg), three pieces of cranium (left parietal) and a left 5th rib. Possible discreet (individual) burial, extending only partly within the excavation trench, with the remainder of skeletal evidence left *in situ*. Roman pottery was retrieved from context [062].

Age at Death

Probably neonate/infant

Pathology

No discernible pathology.

4. *Discussion*

Acute infective disease, particularly of soft tissues, is likely to have killed people very quickly in antiquity. Therefore, no evidence of abnormal bone change would be visible (or expected) because the person died before the bone change developed. It is therefore possible that the skeletal evidence represents individuals who were the victims of an acute or soft tissue disease, or died as a result of soft tissue trauma or environmental factors.

Another possible causation is one of cultural or necessitous infanticide, whereby

neonate burial is often associated with the founding or alteration of Romano-British housing (Philpott, 1991; Mays 1993 and 1995).

5. *Archive Report*

Skeleton [066]

Cranial

Identifiable bones include fragmentary right and left frontal bones (metopic suture unfused, <1-2 years), fragmentary right and left brow ridge and orbits, partial right temporal bone (including right petrous), fragmentary right zygomatic arch, fragments of right parietal and occipital bones. The right sphenoid is present, as is the *pars basilaris* and right and left *pars lateralis*. The right portion of the maxilla is present, unfused along the midline (<1 year). The right portion of the mandible is also present. Fourteen unidentified skull fragments.

Dentition

Right part of Maxilla: 1st and 2nd deciduous molars lost post-mortem, right 1st and 2nd deciduous incisor lost post-mortem, canine *in situ* not erupted, crown partially developed. Dentition suggests age at death of *c.*2.5 months (Ubelaker 1987, Ten Cate 1989). Two loose molar crowns and one incisor crown (complete formation) found after sieving.

Right part of Mandible: 1st and 2nd deciduous molars lost post-mortem, right 1st incisor lost post-mortem, right 2nd incisor *in situ*, not erupted (crown partially developed) *c.*2.5 months. One loose molar crown (complete formation) found following sieving.

Post Cranial Skeleton

Vertebrae

Fourteen vertebral bodies present of which:

Four Lumbar vertebral bodies - unfused

Five Thoracic vertebral bodies - unfused

Five Cervical vertebral bodies - unfused

Forty vertebral arch segments, representing twenty vertebral arches. All unfused in midline and no fusion to vertebral bodies (<1-3 years old). Of this material:

Two segments of Atlas, representing one Atlas

Ten Thoracic arch segments, representing five Thoracic vertebrae

Eighteen Cervical arch segments, representing nine Cervical vertebrae

Ten Lumbar arch segments, representing five Lumbar vertebrae

Pelvis

Left and right innominates present and left pubis, all unfused (<1-3 years old). Sacrum not present, post-mortem loss.

Ribs

Right 1st to 10th ribs present, mostly complete

Left 3rd to 9th ribs present, mostly complete

Sternum present

Left Arm

Scapula - fragmentary, with much of blade missing (post-mortem). Unfused epiphyseal ends, with epiphyses not found.

Humerus - proximal and midshaft only (post-mortem loss of distal end). Unfused epiphyseal end, with epiphysis not found.

Clavicle, Radius, Ulna and hand bone missing - post-mortem loss.

Right Arm

Scapula - intact, with unfused epiphyses. Epiphyseal ends not found.

Clavicle - intact, epiphyseal ends unfused.

Humerus - intact, unfused proximal and distal epiphyses. Epiphyseal plates not found.

Radius, Ulna and hand bones not found - post-mortem loss.

Left Leg

Femur - intact, unfused epiphyses. Epiphyseal plates not found.

Tibia - intact, unfused epiphyses. Epiphyseal plates not found.

Fibula, patella and foot bone missing - post-mortem loss.

Right Leg

Femur - intact, unfused epiphyses. Epiphyseal plates not found. Tibia - intact, unfused epiphyses.

Epiphyseal plates not found. Fibula - intact, unfused epiphyses. Epiphyseal plates not found.

Foot bones and patella missing - post-mortem loss.

Context [062]

Three pieces of cranium (left parietal).

Shaft and thoracic end of Left 5th rib.

Intact neonate/infant Tibia, unfused epiphyses. Epiphyseal plates not found post-mortem loss or still *in situ*.

Single left fibula (proximal end) - unfused epiphyses,

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Appendix 6

The Ceramic Building Materials (CBM), By Phil Mills

Assessment

The fragments were rapidly scanned and identified, and both sherd count and weights were recorded. Most of the pieces are made from fabrics similar to those found in Roman assemblages in the Lincoln and Sleaford area (Mills 1999), suggesting they have a common source or origin. A lot of these pieces were abraded, showing that they have been exposed to the elements and plough-damaged for some time. The tegula bodies are thicker than their counterparts observed in Lincoln or Sleaford and should be retained until more complete forms are identified.

A single fragment was classified as similar to fabric SPS-6, though tended to be very pale and very dense. This piece was retained for further examination. Some fragments of flue tile were noted, one of which had been combed. Flue tiles were used to channel hot air through the walls of Roman buildings, and the presence of this fragment shows that some buildings in the area were equipped with this form of heating system.

Tile that had been cut into small squares (*tesserae*) were also noted, representing the disturbed remains of mosaic floors. These should be kept for further examination.

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CBM Catalogue

	Fabric	Weight (g)	No
TRENCH 14 +			
B/T	SPS1	625	20
Tegula	FRR2/3 SPS2	310	2
TRENCH 11 +			
	SPS1	25	1
B/T	SPS2	100	1
Flue tile ?	SPS6	155	1 <i>uncertain about fabric - high fired very dense very pale. Could be tegula but flange too thin. - Possibly medieval US/T11</i>
003			
B/T	SPS2	5	2
009			
B/T	SPS2	25	10
019			
B/T	SPS1	5	3
022			
B/T	SPS6	35	5
025			
B/T	SPS2	5	3
057			
Tesserae	SPS3	25	1
061			
B/T	SPS1	235	2
Imbrex	SPS1	140	1
Tegula	SPS1	590	0
062			
B/T	SPS2	15	1
063			
B/T	SPS1	55	2
B/T	SPS1	820	25
Flue Tile	SPS1	250	1 <i>comb pattern</i>
Imbrex	SPS1	420	4
Tegula	SPS4	265	5
Tegula	SPS2	905	1
Tesserae	SPS1	80	3
067			
B/T	SPS1	730	30
B/T	SPS2	120	3
Flue Tile	SPS1	45	1
068			
B/T	SPS1	190	14
Imbrex	SPS1	110	1
078			
B/T	SPS1	30	2

Appendix 7

Catalogue of Roman Pottery, By Barbara Precious

KEY

DWSH	Dales ware
GREY	Grey ware
NVCC	Nene Valley colour-coated ware
OX	Oxfordshire ware
SHEL	Shelly ware

CONTEXT	FABRIC	FORM	DEC	NOTES	DRAW	COMMENTS	JOIN	SHERDS
TR11+	ZZZ					1 FRAG CBM		
TR12+	MOMH	M				BS		1
TR12+	OX					BS		1
TR12+	ZDATE					3C		
21	GREY	J?				1 BSS		3
21	GREY					BSBURNT		1
21	ZZZ					1 FRAG POSTMED		
21	ZDATE					RO/POSTRO		
25	OX					FLAKE		1
25	ZDATE					RO		
51	SHEL					BS		1
51	ZDATE					2-4C		
57	GREY					BSS		4
57	GREY					BASE STRING		1
57	GREY	OPEN				BASE		1
57	NVGWC					BSBURNT		1
57	OX					SCRAP ABR		1
57	NVCC	BK				BS		1
57	DWSH	JDW				RIM		1
57	ZDATE					M3+		
61	GREY	JL				BS		1
61	GREY					BSS		3
61	SHEL					BSS		2
61	SHEL		RIL			BS		1
61	NVCC	BKBARB	BAVE			BS		1
61	OXRC	BHEM	ROUL			RIM		1
61	CC	B99A		1?	DI	RIM BSS AS NARS FORM 99A UNUS FAB		3
61	ZZZ					V UBUS NARS VESS RESEARCH BJP		
61	ZDATE					4C		
62	GREY				1	BSS		2
62	GREY					BS		1
62	NVCC	BK				BS		1
62	ZDATE					3C+		
63	GREY					BSS		8
63	GREY					IBASE		1
63	OX					BSS RO?		2
63	CR					BS ABR		1
63	NVCC	BK				BS		1
63	NVCC	B?				BS		1
63	GYMS					BS		1
63	ZZZ					SOME ABR SOME ?RO		
63	ZDATE					L3		
67	GREY					BSS		4
67	OX					BS		1
67	GREY	JBKEV				RIM		1
67	ZZZ					1SH POSTMED		
67	ZDATE					2C+POSTRO		
68	GREY					BSS		6
68	GREY					BS BURNT		1
68	SHEL					BS		1
68	NVCC	BK			1	BSS		2
68	ZZZ					2 SHS POSTMED		
68	ZDATE					3C+POSTRO		
93	GREY	BWM				RIMABR		1
93	ZDATE					3-4C		
94	GREY	BWM				RIM		1
94	NVCC	BFB				RIM GIRTH		1
94	GREY					BS		1
94	ZZZ					NVCC FRESH		
94	ZDATE					4C		
1009	GREY					BS		1
1009	GREY					BS		1
1009	SHEL					BS		1
1009	SHEL					BS		1
1009	ZDATE					RO		

Appendix 8

Extract from the Geophysical Survey Report, By Oxford Archaeotechnics

1. INTRODUCTION

- 1.1 Geophysical survey was commissioned by Archaeological Project Services (APS) on behalf of Anglian Water Services Limited on land immediately north of the A52 at Dembleby Gorse, Haceby, c.10 km east of Grantham, Lincolnshire in advance of pipeline construction. The fieldwork was carried out in September 1998.
- 1.2 The survey area (centred on TF 01950 37050) comprised a 180 x 40 m corridor (0.72 ha in area) along the north side of the A52 Salter's Way, a probable Roman route which may have adopted the line of a prehistoric trackway. The location is shown on Fig. 1.
- 1.3 The survey area lies between 70.5 and 63.5 m AOD, sloping uniformly to the east to within 70 m of the pond shown on the OS 1:2500 sheet at TF 02100 37050, where the field becomes relatively flat. The land lies on the Jurassic limestone ridge which forms the first raised escarpment the fen edge, which lies some 12 km to the east. The soils are mapped as belonging to the Aswarby Association over interbedded Jurassic limestone and clays. The land was under corn stubble at the time of survey.
- 1.4 The survey corridor lies almost equidistant between two known Romano-British buildings. Less than 100 m to the south, lies the site of Haceby villa, which was originally discovered (together with a mosaic floor) in 1818 (Whitwell 1970). Partial excavation in 1929 by cadets and officers of the RAF College at Cranwell revealed part of a bath-suite; no dating evidence was recovered during this work (Taylor & Collingwood 1929, de la Bere 1935, Lane 1995). The site is a Scheduled Ancient Monument. Less than 100 m to the northwest, within an area of woodland known as Dembleby Gorse, the County Sites and Monuments Record (SMR) records the discovery of Romano-British pottery and building debris. The objectives of the geophysical survey were to determine the extent and possible geometry of archaeological features located during a recent trial trenching evaluation programme carried out by APS, which located Roman material including building rubble overlying a dump of burnt material within a 10 m square trench sited almost central to the survey area (centred on NGR TF 01978 37018), but found no archaeological evidence within trenches spaced at 100 m intervals to both east and west (pers. comm. G. Taylor, APS). The location of the APS trenches in relation to the geophysical survey corridor is shown on Fig. 2.
- 1.5 The geophysical survey comprised a combination of topsoil magnetic susceptibility field sensing and magnetometer (gradiometer) survey. An explanation of the techniques used, and the rationale behind their selection, is included in an Appendix to the present report.

2. MAGNETIC SURVEY DESIGN

- 2.1 Survey control was established to a local grid based on a 40 m offset into the field from an existing wooden survey marker (at approximately NGR TF 02060 37020) sited at the southern edge of the survey corridor between the two APS evaluation trenches. Further control was established to the corners of the square evaluation trenches and the end of hedgebank situated 125 m west of the survey corridor (further survey details are available if required).
- 2.2 The equipment used for the direct topsoil magnetic susceptibility survey was a Bartington Instruments MS2 meter with an 18.5 cm loop.
- 2.3 *In situ* magnetic susceptibility readings were taken on a 10 m grid, an interval known to give a high probability of intersecting with dispersed horizons from a wide range of archaeological sites, particularly those associated with occupation and industrial activity from the later prehistoric period onwards. Soils over former occupation and industrial sites usually register as stronger patterning, frequently showing a marked focus. Agricultural activity helps to both generate (by ploughing casting up underlying deposits), and ultimately disperses the more magnetic soils over a wider area. Patterns recorded by 10 m magnetic susceptibility mapping tend to define zones of former activity rather than locate individual elements. Nevertheless, in some contexts, a focus of markedly stronger soil magnetic susceptibility (or markedly magnetically lower soils indicative of ploughed down earthworks) is occasionally found to relate to material dispersed from specific underlying features.
- 2.4 The whole of the survey corridor was also investigated by detailed gridded gradiometer survey with a Geoscan Research FM 36 Fluxgate Gradiometer (sampling 4 readings per metre at 1 metre traverse intervals in the 0.1 nT range). The nanotesla (nT) is the standard unit of magnetic flux (expressed as the current density), here used to indicate positive and negative deviations from the Earth's normal magnetic field.
- 2.5 The topsoil magnetic susceptibility colour shade plot (Fig. 5) shows contours at 5 SI intervals. Magnetometer data have been presented as grey scale and stacked trace (raw data) plots (Figs. 3 & 4), an interpretation of results is shown on Fig. 3 and an overview on Fig. 6.

3. SURVEY RESULTS

TOPSOIL MAGNETIC SUSCEPTIBILITY MAPPING (Fig. 5)

- 3.1 84 *in situ* magnetic susceptibility readings were recorded. Susceptibility is reported in SI: volume susceptibility units ($\times 10^{-5}$), a dimensionless measure of the relative ease with which a sample can be magnetized in a given magnetic field.
- 3.2 *In situ* topsoil susceptibility measurements showed a dynamic range between 17 and 85 ($\times 10^{-5}$) SI units. The mean for the survey was 41 SI units and the standard deviation calculated against the mean was 16.6 SI units.
- 3.3 Almost three quarters of the survey corridor displays relatively low levels of topsoil magnetic susceptibility (15 - 45 SI), showing evidence for quite subtle east-west patterning, whilst the topsoil susceptibility increases dramatically (up to 85 SI) within a 40 m wide band along the eastern edge of the survey corridor. This abrupt interface, which runs parallel with the extant modern field boundaries, is probably attributable to a former boundary between cultivation blocks.
- 3.4 Within the magnetically weaker zone lies one small focus showing slight enhancement, situated between 100 and 110 m from the western edge of the survey corridor, close to the hedgeline, where an APS evaluation trench (see 1.4 above) has revealed archaeological features of Romano-British date, and close to an area in which subsequent gradiometer survey suggested some local activity, including an area containing burnt deposits (see 3.7 below).
- 3.5 No corresponding magnetic anomalies were revealed by subsequent gradiometer survey to account for the strong topsoil magnetic susceptibility patterning within the relatively easternmost quarter of the survey corridor. It is probable that the marked contrasts represent differential activity within this area (formerly a separate field) which has locally modified the magnetic identity of the topsoils; the incorporation of locally burnt horizons may provide an alternative explanation. On present evidence, the pattern is difficult to interpret within the relatively narrow corridor. However, as this zone of high topsoil magnetic susceptibility levels corresponds with a topographically low area, it is possible that the magnetically stronger soils represent the presence of colluvial deposits derived from anthropogenically modified horizons immediately upslope to the west.

MAGNETOMETER (GRADIOMETER) SURVEY (Figs. 3 & 4)

- 3.6 The gradiometer plot shows two distinct patterns of magnetic anomalies, a number of discrete and for the most part pit-like features, and secondly, broad erratic zones which represent magnetically confused horizons, probably incorporating structural elements and dispersed structural debris. It is difficult to determine any clear geometry within these zones, although the nucleus of such activity can be clearly

recognised. The principal focus covers an area 20 m in diameter lying close to the hedge, some 45 - 60 m from the western edge of the survey corridor. Romano-British roofing material (tile and diamond-shaped slates) together with a number of dressed limestone blocks were noted during the course of the survey along the hedgeline at this location. There is a slight suggestion that this area may be enclosed by a rectilinear enclosure on an alignment at 45 degrees to the survey corridor. The substantial anomalies representing probable pit forms, ranging in size between 1- 2 and up to 4 - 5 m in diameter, appear generally as more isolated features situated mainly west and north of this area of disturbance.

- 3.7 Beyond this area to both the northwest and east, extending for a distance of some 30 m, the background is generally stable and magnetically 'quiet'. Further magnetic activity is visible in the vicinity of the APS evaluation trench, where a cluster of anomalies indicative of intrusive features are visible; included within this group, lying immediately northwest of the evaluation trench is a zone measuring some 3-4 x 5 m, which may include *in situ* burnt material, or concentrations of brick and tile; a group of pits is clustered immediately to the east of the trench. A substantial intrusion, which may also include magnetically enhanced burnt/fired material, and measuring some 8 x 4 m, lies 35 m northeast of the trench.
- 3.8 The northeastern angle of the survey corridor is crossed by a linear anomaly, probably a ditch, which is visible for a distance of 10 m running on a eastnortheast-west southwest alignment. Other linears are suggested on the interpretation plot (Fig. 3). These appear, for the most part, to be agricultural in origin, although there are suggestions of others on a southwest-northeast alignment, one being visible for a distance of 70 m, which cannot be readily explained by modern agricultural activity.
- 3.9 Very little ferrous debris was recorded.

4. CONCLUSIONS

- 4.1 Within areas of archaeological potential, stronger patterns of topsoil magnetic enhancement tend to reflect anthropogenic activity, particularly in proximity to a building where it might be expected that subsequent cultivation would have incorporated particles of burnt/fired material and habitation debris into the topsoil. There is, curiously, however, very little correspondence within the survey corridor between the magnetic anomalies recorded by magnetometer (gradiometer) survey, and the patterns revealed by the topsoil magnetic susceptibility map: where there is strong topsoil magnetic susceptibility patterning close to the eastern edge of the survey corridor, only one corresponding 'cut' feature was found, whilst topsoils within the western part of the corridor, which yielded much weaker and more subtle magnetic susceptibility patterning, have been demonstrated by gradiometer survey to overlie archaeological horizons and substantial 'cut' features. Seen within such a relatively narrow corridor, the reasons for this apparent inversion are difficult to explain, although it is possible that the increased enhancement has been derived from an anthropogenic source further upslope.
- 4.2 Gradiometer survey has identified a number of features with clear archaeological potential generally dispersed within the survey corridor, but with a significant concentration of activity probably indicative of underlying structural material along the southernmost (roadside) boundary, at a location in which Romano-British structural debris was noted alongside the modern hedgeline.
- 4.3 Probable features of archaeological significance detected by the gradiometer comprise areas of disturbance and structural remains/debris and probable areas of burning or concentrations of fired material. The general absence of magnetic anomalies suggesting substantial ditches (with the exception of a clear linear crossing the northeastern angle of the survey corridor), is unusual, although it is possible that linears infilled with low susceptibility material may not have been visible to the magnetometer.

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Topsoil magnetic susceptibility mapping and magnetometer survey by Oxford Archaeotechnics Limited under the direction of A.E. Johnson BA, with: M. Tomkins BA, MA..

APPENDIX - MAGNETIC TECHNIQUES: GENERAL PRINCIPLES

- A1.1 It is possible to define areas of human activity (particularly soils spread from occupation sites and the fills of cut features such as pits or ditches) by means of *magnetic survey* (Clark 1990; Scollar et al. 1990). The results will vary, according to the local geology and soils (Thompson & Oldfield 1986; Gale & Hoare 1991), as modified by past and present agricultural practices. Under favourable conditions, areas of suspected archaeological activity can be accurately located and targeted for further investigative work (if required) without the necessity for extensive random exploratory trenching. Magnetic survey has the added advantages of enabling large areas to be assessed relatively quickly, and is non-destructive.
- A1.2 Topsoil is normally more magnetic than the subsoil or bedrock from which it is derived. Human activity further locally enhances the magnetic properties of soils, and amplifies the contrast with the geological background. The main enhancement effect is the increase of *magnetic susceptibility*, by fire and, to a lesser extent, by the bacterial activity associated with rubbish decomposition; the introduction of materials such as fired clay and ceramics - and, of course, iron and many industrial residues - may also be important in some cases. Other agencies include the addition and redistribution of naturally magnetic rock such as basalt or ironstone, either locally derived or imported.
- A1.3 The tendency of most human activity is to increase soil magnetic susceptibility locally. In some cases, however, features such as traces of former mounds or banks, or imported soil/subsoil or non-magnetic bedrock (such as most limestones), will show as zones of lower susceptibility in comparison with the surrounding topsoil.
- A1.4 Archaeologically magnetically enhanced soils are therefore a response of the parent geological material to a series of events which make up the total domestic, agricultural and industrial history of a site, usually over a prolonged period. Climatic factors may subsequently further modify the susceptibility of soils but, in the absence of strong chemical alteration (e.g. during the process of podzolisation or extreme reduction), magnetic characteristics may persist over millions of years.
- A1.5 Both the magnetic contrast between archaeological features and the subsoil into which they are dug, and the magnetic susceptibility of topsoil spreads associated with occupation horizons, can be measured in the field.
- A1.6 There are several highly sensitive instruments available which can be used to measure these magnetic variations. Some are capable, under favourable conditions, of producing extraordinarily detailed plots of subsurface features. The detection of these features is usually by means of a *magnetometer* (normally a fluxgate gradiometer). These are defined as passive instruments which respond to the magnetic anomalies produced by buried features in the presence of the Earth's magnetic field. The gradiometer uses two sensors mounted vertically, often 50 cm apart. The bottom sensor is carried some 30 cm above the ground, and registers local magnetic anomalies with respect to the top sensor. As both sensors are

affected equally by gross magnetic effects these are cancelled out. In order to produce good results, the magnetic susceptibility contrast between features and their surroundings must be reasonably high, thereby creating good local anomalies; a generally raised background, even if due to human occupation within a settlement context, will sometimes preclude meaningful magnetometer results. The sensitive nature of magnetometers makes them suitable for detailed work, logging measurements at a closely spaced (less than 1 metre) sample interval, particularly in areas where an archaeological site is already suspected. Magnetometers may also be used for rapid 'prospecting' ('scanning') of larger areas (where the operator directly monitors the changing magnetic field and pinpoints specific anomalies).

- A1.7 *Magnetic susceptibility measuring systems*, whilst responding to basically the same magnetic component in the soil, are 'active' instruments which subject the sample area being measured (according to the size of the sensor used) to a low intensity alternating magnetic field. Magnetically susceptible material within the influence of this field can be measured by means of changes which are induced in oscillator frequency. For general work, measuring topsoil susceptibility *in situ*, a sensor loop of around 20 cm diameter is convenient, and responds to the concentration of magnetic (especially ferrimagnetic) minerals mostly in the top 10 cm of the soil. Magnetically enhanced horizons which have been reached by the plough, and even those from which material has been transported by soil biological activity, can thus be recognised.
- A1.8 Whilst only rarely encountering anomalies as graphically defined as those detected by magnetometers, magnetic susceptibility systems are ideal for detecting magnetic spreads and thin archaeological horizons not seen by magnetometers. Using a 10 m interval grid, large areas of landscape can be covered relatively quickly. The resulting plot can frequently determine the general pattern of activity and define the nuclei of any occupation or industrial areas. As the intervals between susceptibility readings generally exceed the parameters of most individual archaeological features (but not of the general spread of enhancement around features), the resulting plots should be used as a guide to areas of archaeological potential and to suggest the general form of major activity areas; further refinement is possible using a finer mesh grid or, more usually, by detailing underlying features using a gradiometer.
- A1.9 Magnetic survey is not successful on all geological and pedological substrates. As a rule of thumb, in the lowland zone of Britain, the more sandy/stony a deposit, the less magnetic material is likely to be present, so that a greater magnetic contrast in soil materials will be needed to locate archaeological features; in practice, this means that only stronger magnetic anomalies (e.g. larger accumulations of burnt material) will be visible, with weaker signals (e.g. from the fillings of simple agricultural ditches) disappearing into the background. Similar problems can arise when the natural background itself is very high or very variable (e.g. in the presence of sediments partially derived from magnetic volcanic rocks).
- A1.10 The precise physical and chemical processes of changing soil magnetism are extremely complex and subject to innumerable variations. In general terms,

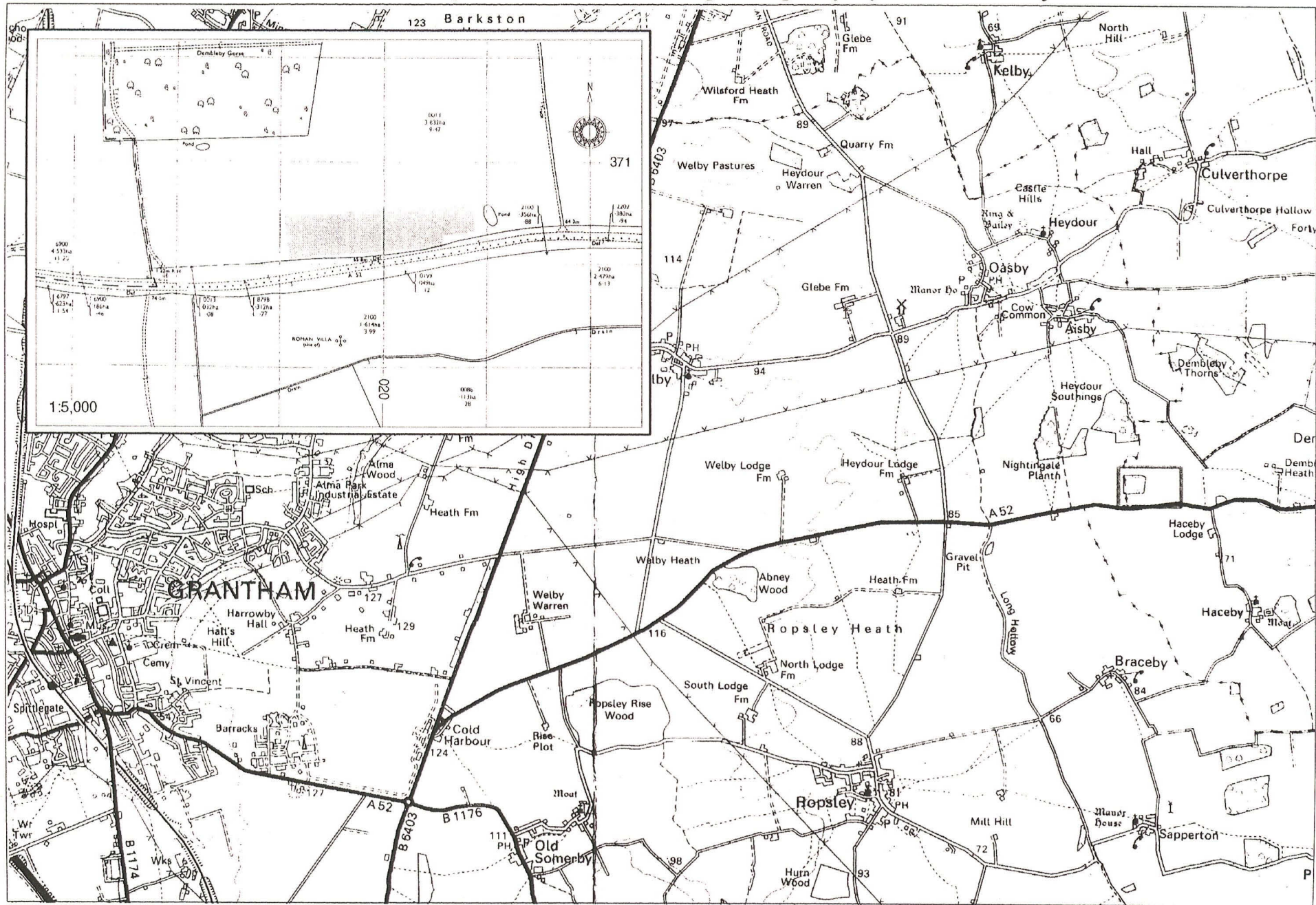
however, there is no doubt that magnetic enhancement of soils by human activity provides valuable archaeological information.

- A1.11 As well as locating specific sites, topsoil magnetic susceptibility survey frequently provides information relating to former landuse. Variations in the soils and subsoils, both natural and those enhanced by anthropogenic agencies, when modified by agriculture, give rise to distinctive patterns of topsoil susceptibility. The containment of these spreads by either natural or man-made features (streams, hedgerows, etc.) gives rise to a characteristic chequerboard or strip pattern of varying enhancement, often showing the location of former field systems, which persist even after the physical barriers have been removed. These patterns are often further amplified in fields containing underlying archaeological features within reach of the plough. More subtle landuse boundaries and indications of former cultivation regimes are often suggested by topsoil magnetic susceptibility plots.
- A1.12 Where a general spread of magnetically enhanced soils contained within a long-established boundary becomes admixed over a long period by constant ploughing, it can be diffused to such a point that the original source is masked altogether. Magnetically enhanced material may also be moved or masked by natural agencies such as colluviation or alluviation. Generally, it appears that the longer a parcel of land has been under arable cultivation, the greater is the tendency for topsoil susceptibility to increase; at the same time there is increasing homogeneity of the magnetic signal within the soils owing to continuous agricultural mixing of the material. Some patterns of soil enhancement derived from underlying archaeological features are, however, apparently capable of resisting agricultural dispersal for thousands of years (Clark 1990).

FIGURE CAPTIONS

- Figure 1. Location maps. Scale 1:50,000 and 1:5,000. Based upon OS 1:50,000 Sheet 130 and OS 1:2500 Sheets TF 0136, 1037, 0236 & 0237.
- Figure 2. Location of survey grids. Based upon OS 1:2500 Sheets TF 0136, 1037, 0236 & 0237.
- Figure 3. Magnetometer (gradiometer) survey: grey shade plot and interpretation. Scale 1:1000.
- Figure 4. Magnetometer (gradiometer) survey: stacked trace (raw data) plot. Scale 1:1000.
- Figure 5. Topsoil magnetic susceptibility survey: colour shade plot. Scale 1:2500. Based upon OS 1:2500 Sheets TF 0136, 1037, 0236 & 0237.
- Figure 6. Magnetometer (gradiometer) survey: overview. Scale 1:2500. Based upon OS 1:2500 Sheets TF 0136, 1037, 0236 & 0237.

Grantham Pipeline: archaeological geophysical survey

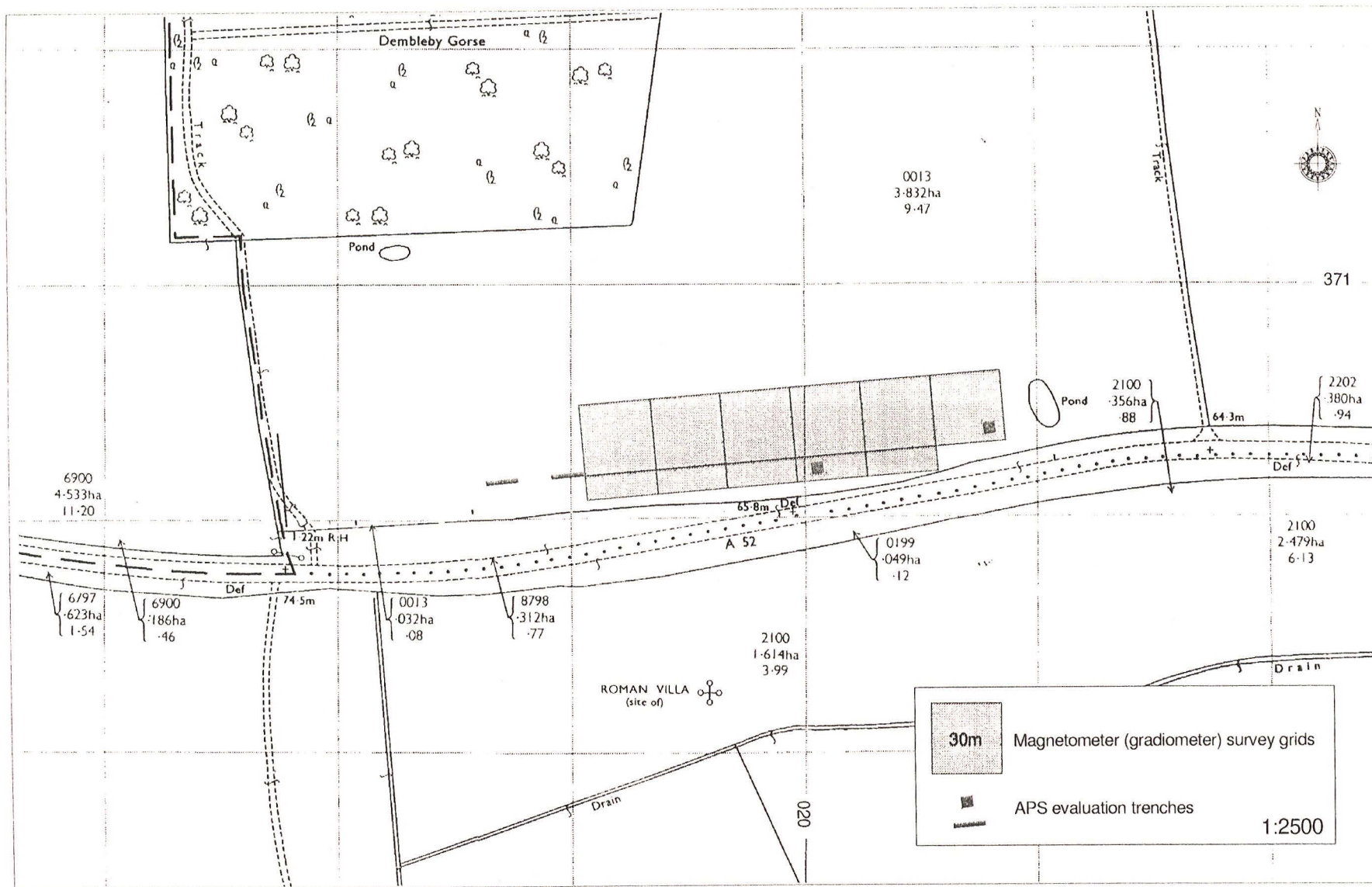


OXFORD ARCHAEOTECHNICS FIG. 1

1:50,000

Location

Grantham Pipeline: archaeological geophysical survey



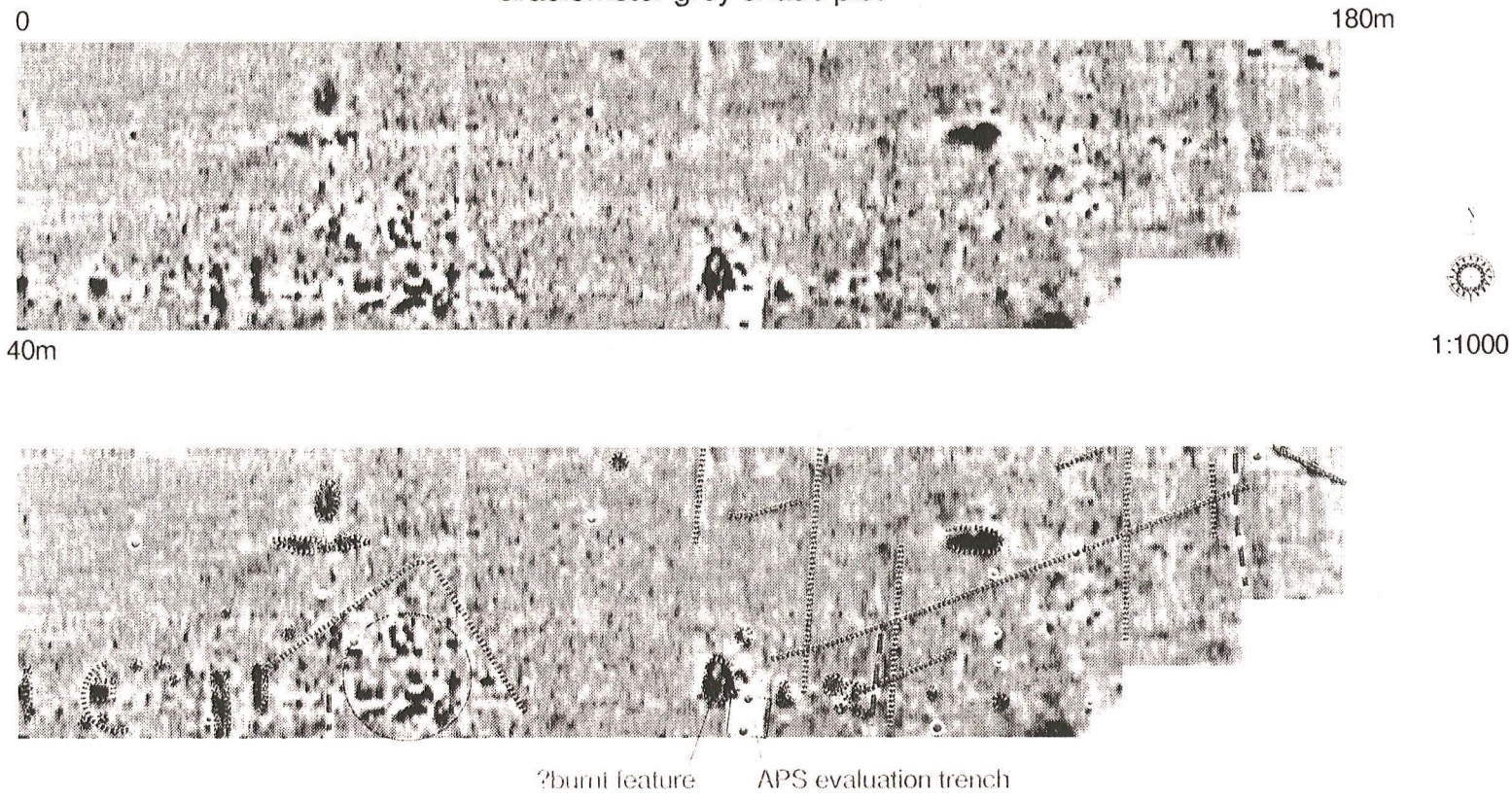
Location of survey grids

OXFORD ARCHAEOTECHNICS

FIG.2

Grantham Pipeline: archaeological geophysical survey

Gradiometer grey shade plot

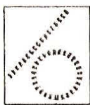


Interpretation



Linear and curvilinear features

— Positive anomaly
- - - Negative anomaly



Weak linear and curvilinear features, including agricultural striations



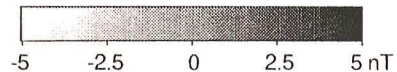
Area containing structural material, disturbed ground and pitting



Possible pits



Ferrous material (main concentrations)



Grantham Pipeline: archaeological geophysical survey

Gradiometer stacked trace plot (raw data)

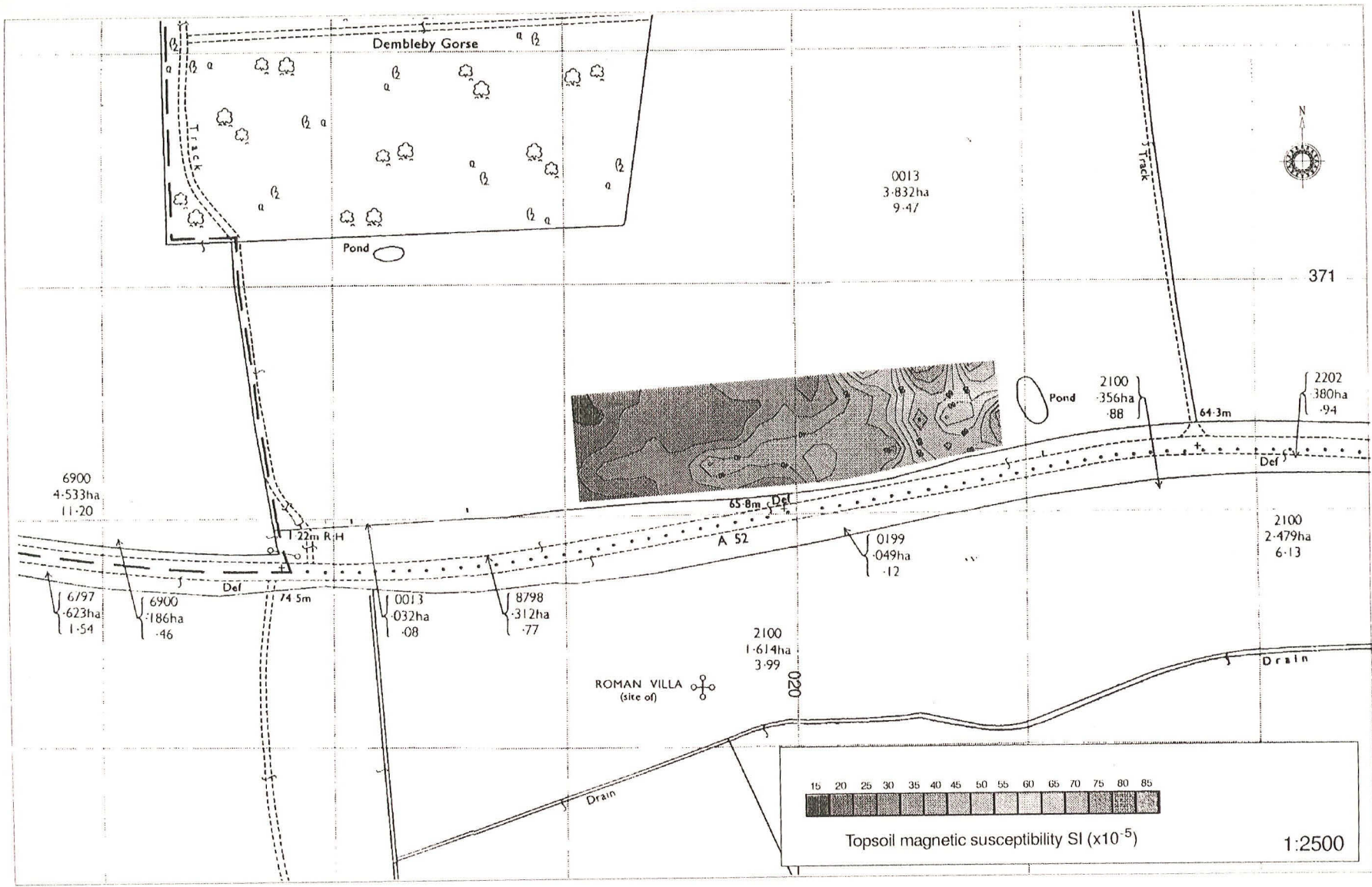


50 nT



1:1000

Grantham Pipeline: archaeological geophysical survey

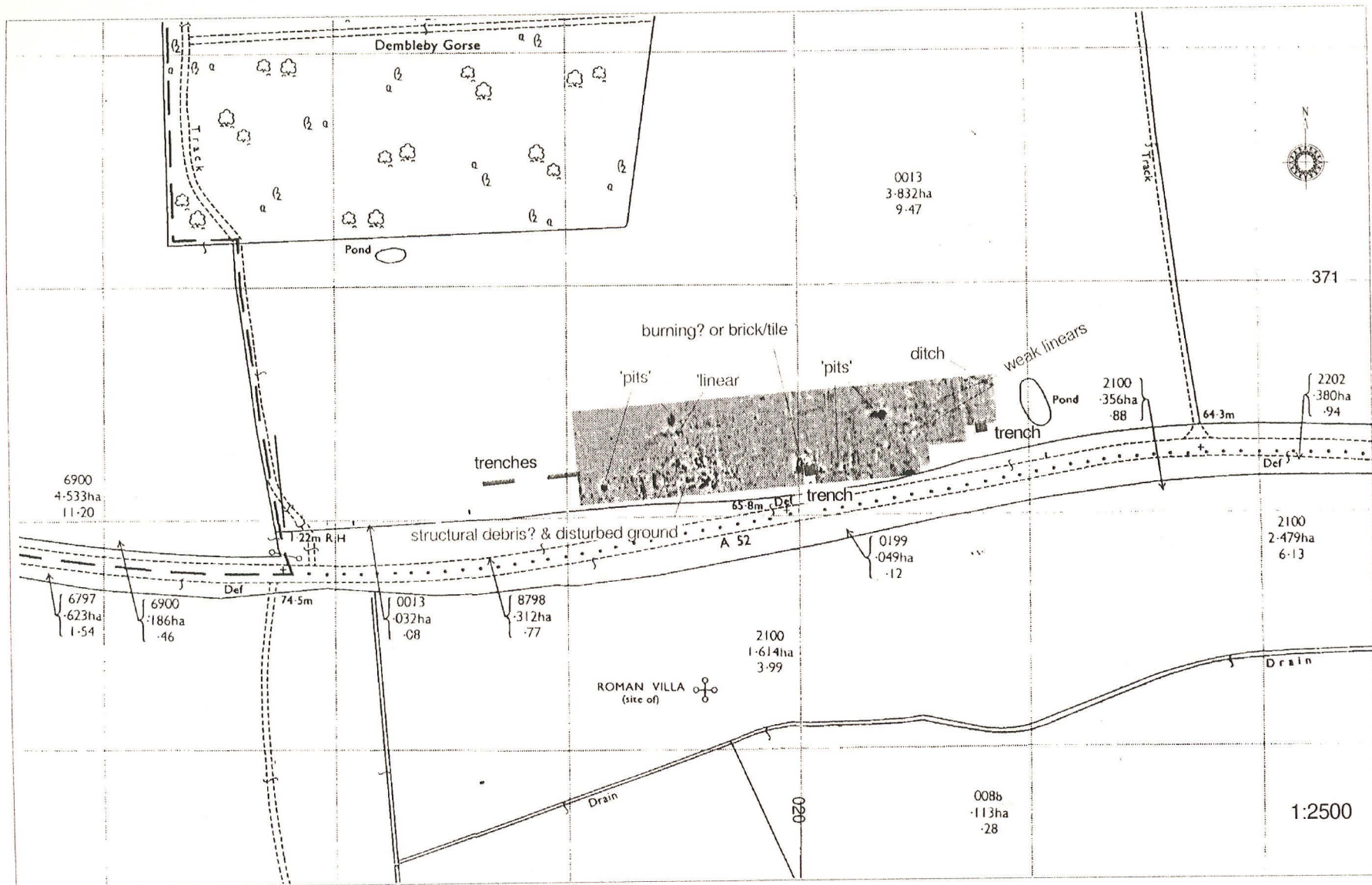


Topsoil magnetic susceptibility

OXFORD ARCHAEOLOGICS

FIG.5

Grantham Pipeline: archaeological geophysical survey



Gradiometer survey: overview