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LAND AT GLEN FARM, GREATFORD, LINCOLNSHIRE

ARCHAEOLOGICAL ASSESSMENT CONTEXTUAL & AERIAL PHOTOGRAPHIC DATA

Produced by **OAA**
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1. INTRODUCTION

1.1 The general archaeological interest of the Proposal Site has been reported by APS (Herbert, N. October 1996. *Desk-Top Assessment of the Archaeological Implications of Proposed Gravel Extraction at Glen Farm, Greatford, Lincolnshire (GGF96)* Archaeological Project Services Report No.35.96 for Ennemix Construction Materials Limited). Further background information has been supplied by OAA (Collcutt, S.N. 1997. *Glen Farm, Greatford, Lincolnshire: Specification of Archaeological Field Survey* Oxford Archaeological Associates Limited Report (20.06.97) for SECOR Limited/Ennemix Construction Materials Limited).

1.2 The purpose of the present report (requested by the County Archaeologist) is to bring together certain geological, topographic, hydrological and aerial photographic data, together with the earlier APS data, to gain a better picture of contextual matters and landscape patterning within the Proposal Site. This compilation is designed to aid the field evaluation programme, not least by setting out certain testable hypotheses (as summarised in the Conclusion). The text (29.8.97) was made available for the start of the first phase of evaluation (geophysics and fieldwalking), although it has since been brought up to date to take account of ground water levels recorded at 10.9.97.

2. GEOLOGY

2.1 The basement geology in the vicinity of the Proposal Site corresponds broadly with the gross regional topography, the geology dipping eastwards and southeastwards more abruptly than the surface, so that the outcrops drops and youngs eastwards. To the west and northwest, there is an 'upland' area, reaching c.50 m AOD, composed of Lower and Middle Jurassic Lias and Oolitic beds. Still west of the West Glen River, there are outcrops of the Kellaways Group and Cornbrash, fluvially derived material from which has often been observed to have relatively high magnetic susceptibility. Upper Jurassic Oxford Clay (bluish and greenish grey mudstones, weathering to a grey plastic clay) caps much of the local sequence; it is present at all points beneath the Proposal Site, at c.6-4 m AOD and dipping to the east at a gradient of c.0.001.

2.2 The true Fenland edge lies some 2-3 km east and southeast of the Proposal Site, at surface altitudes of c.4-5 m AOD. The zone between the western 'upland' and the Fenland, a zone sloping down (with interruptions by river valleys) from c.15 m AOD, has been called 'marginal Fenland' or 'the Fenland edge'. Such terms have general topographical validity but they may be misleading in that this zone was never occupied by Holocene fen. Rather, the Quaternary deposits consist of fluvial sands and gravels, mapped by the IGS as First Terrace (but see 2.4-5 below). The gravel fraction is reported as consisting of limestone, flint, sandstone, quartzite and iron stone, representative of the broad catchment terrains peripheral to the Fenland. There is a roughly equal proportion of sand, but the deposits are low in finer material. Strong iron panning has been noted in the upper levels of the sands and gravels right across the Deepings area, with massive cementation at points in the vicinity of Greatford. Overburden is reported as 0.9 m thick on average across the general area, consisting of loamy sands, silts or clays with occasional pebbles and shells, interpreted as due to weathering of the terrace deposits or of a former finer alluvial cover.

2.3 The position of all known boreholes within the Proposal Site are shown in Fig.GR4. Only stratal thicknesses are available for the 1988 (RMC) set, whilst only the site journal is available for the

1996 (Foundation & Exploration Services) set. Full logs are available for the 1997 set, supervised by SECOR (for Ennemix).

2.4 The observed thicknesses of sand and gravel range from 1.9 to 5.3 m within the Proposal Site. Estimated isopachytes are shown in Fig.GR5, whilst the contours of the underlying Oxford Clay surface are shown in Fig.GR6. Examination of the two figures suggests two (probably) fluvial troughs, both trending very roughly SW-NE. The trough in the western third of the Site has a rather irregular Clay base at c.6.5-5.5 m AOD with no clear primary thalweg; the sands and gravels are about 3.5-4.5 m deep at their thickest. The trough in the eastern two-thirds of the Site has a Clay base at c.4.5 m AOD with a clearer primary thalweg; the sands and gravels are about 4.4-5.3 m deep at their thickest. The western trough is plausibly associated with former, possibly meandering, courses of the West Glen River; aerial photographs (RCHME Swindon, cf. Section 5 below) of the field immediately north of the Proposal Site in this area certainly show strong banding (roughly N-S, swinging further to the northeast to NE-SW trends, concave westwards to southwestwards), strongly suggestive of lateral accretion (scroll bars) in a generally northeastwards-flowing river. The Clay base rises to a 'ridge' at c.8-7 m AOD (the 'ridge-line' dropping to the northeast) along the southeastern margin of the trough, although there are 'cols' to levels below 6.5 m AOD; the 'ridge' may be covered by as little as 1.9 m of sand and gravel. The eastern trough is developed on the other side of the dividing 'ridge', and there are signs that its southeastern margin may lie only just beyond the southeastern corner of the Proposal Site.

2.5 The mapping by the IGS of all these gravels as a single 'Terrace' is therefore inaccurate. Geological cropmarks are only very poorly developed within the Proposal Site itself, suggesting that major fine-grained terminal palaeochannels are not likely to be common/present. The plausible lateral accretion structures within the downstream continuation of the western trough were noted above; it is possible that this is an early Holocene terrain. Fluvial structures are not apparent at all on aerial photographs of the eastern trough, although there are quite common (if intermittent and faint) traces of polygonal ground (ice-wedge casts); it is possible that this terrain pre-dates the last Pleistocene cold period. If this interpretation is correct, the eastern trough must derive from a different system from the West Glen River, a system which subsequently migrated to the east or southeast; there is no possible

mechanism (such as a glacier body) which could have constrained the West Glen to migrate northwestwards at a higher base level (at least, not at a date after the Middle Pleistocene). An alternative (possibly complementary) interpretation is that both the troughs are dominantly Pleistocene (with the upper western trough being the older) and that the West Glen River is a much later enlargement of a simple back-terrace drain or is an abandoned thalweg later revitalised by catchment capture (i.e. it had no major part in creating the main fluvial deposits although it may have restructured the upper sediments).

2.6 There appears to be a consistent vertical stratification in particle size distribution of the mineral bodies across the Proposal Site. The lower deposits in any one of the seven analysed sequences have only 1-2% fines (silts and clays <0.06 mm) but the uppermost metre in any given column has significantly more fines. This effect is slightly more marked (up to 23% fines) in the western trough than in the eastern; the zone of least enrichment in fines follows the line of the dividing Clay base 'ridge' between the two troughs. All the lower levels show a single mode in the fine gravels (6-20 mm), albeit with a very significant sand tail, whilst all the uppermost metre samples show two modes, the primary in the coarse sands to fine gravels (3-10 mm) and the secondary in the medium sands (0.2-0.5 mm). These figures suggest that there is a true, if slight, fining upwards in each sequence, attributable to the original hydrodynamics; although the superficial enrichment in silt/clay is probably partially due to a combination of later infiltration and the counting of 'crushed' iron-rich cement, the drilling logs mention discrete banding in fines at times in the uppermost metre. In any case, all these deposits can be classified (with respect to the implications for archaeology) as relatively 'coarse' (in the uppermost metre, a 25-percentile in the range 0.1-0.3 mm and a 50-percentile in the range 0.6-1.5 mm; in the lower deposits, a 25-percentile >1.0 mm and a 50-percentile >4.0 mm).

2.7 Borehole samples confirmed the presence, in the coarser fractions, of rounded and sub-rounded gravels of flint, fine-grained sandstone, moderately strong limestone, quartzite and ironstone. Iron-cemented horizons were present within the uppermost metre, sometimes strong enough to require a hammer be break aggregates. The drilling journal also noted that all deposits of the eastern trough

(including the zone of the dividing Clay base 'ridge') were "cemented" down to 2, sometimes 3 m depth below surface.

2.8 The 'soils' or 'overburden' within the Proposal Site have been variously described. Overburden depth was recorded by RMC as in the range 0.5-0.9 m (1988 'M') and 0.6-0.9 m (1988 'A'). Topsoil thickness was recorded in 1996 as in the range 0.2-0.5 m and occasionally 0.8 m. In 1997, topsoil was recorded as a firm brown clayey silt with a thickness in the range 0.4-0.65 m. A more systematic survey of soil resources (provided by SECOR), on a regular 100 m grid, has recognised only one soil type within the Proposal Site. Topsoil, on average 0.3 m thick, is described as predominantly medium loamy, with mainly sandy clay loam or medium clay loam; there are usually fewer than 10% stones by volume (mostly small). The subsoil comprises brownish sandy clay loam and medium clay loam, with occasional occurrences of sandy loam and loamy sand; the material is mostly slightly to moderately stony, although stones are usually small. Subsoil is commonly 0.1-0.2 m thick, but may be 0.7-0.9 m thick locally as the fill of patterned ground features (e.g. ice-wedge casts), which may be 1-2 m wide near the surface. The parent material is described as dark brown and yellowish brown, calcareous, variably stony (mainly small limestone and flint fragments), loamy drift of "moderate thickness". The mineral below is characterised as yellowish brown, bedded, very calcareous sands and limestone gravel. It was noted that the soils within the Proposal Site are mainly free-draining, although it was also stated that "upper layers" (possibly of lower subsoils) are slightly heavier towards the east, and locally gleyed. This last point apart, none of the available data suggest that there is any significant horizontal zonation in soil type.

3. TOPOGRAPHY

3.1 The topography of the Proposal Site is shown in Fig.OAA3. As an overall trend, the land slopes gently eastnortheastwards, from 11.25 m AOD in the western corner to 8.75 m AOD in the east.

3.2 However, superimposed upon this general trend, there are a number of anomalous topographic features, most of which are likely to be of human origin; in the main, the matter of origins will be discussed further in Section 6 below.

3.3 First, there are four alignments, each running SSW-NNE, that is, approximately at right angles to the long boundaries of the Proposal Site.

3.4 The first feature (labelled 'BANK 1') rises to just over 10.75 m AOD along its crest (this crestline dropping very slightly towards the NNE) and probably has a maximum local relief of no more than 0.25 m, possibly very slightly more and/or steeper on the 'downhill' eastern side; the 'bank' appears to have a width (that is, a plough-dispersed expression or 'spread') of as much as 30-35 m in places. BANK 1 divides the westerly surviving field within the Proposal Site roughly in two.

3.5 The second feature (labelled 'BANK 2') is the extant field boundary, also carrying a ditch and a track. There is a c.0.25 m rise on the west side and a drop of over 0.5 m on the east side, with a width (spread) of some 50 m; again, the crestline drops slightly to the NNE.

3.6 The third feature (labelled 'BANK 3') occurs about a third of the way eastwards into the main eastern field. This feature is less obvious than the preceding two. The crestline is slightly curved (concave ESE) and drops from 10.25 m AOD at the SSW end to 9.75 m AOD at the NNE end; the width (spread) is only c.20 m and there is unlikely to be more than 0.25 m relief overall.

3.7 The fourth feature (labelled 'BANK 4') occurs about two-thirds of the way eastwards into the main eastern field. The feature is hardly a 'bank' at all (there being only two localised points at which it

may show relief of up to 0.25 m to an absolute height of 9.75 m AOD); rather, it is a very low lynchet, falling slightly more steeply on the east side.

3.8 One further partial bank (labelled 'BANK 5') is present at the extreme easterly edge of the Proposal Site. The bank is very slightly off (rotated anti-clockwise from) the alignment of the modern King Street and its flanking drain, and survives with a relief of some 0.5 m over a partial width of c.25 m in the northeasterly corner of the Site. This feature is almost certainly the (spread) edge of the *agger* of the original Roman King Street.

3.9 One further topographic feature (labelled 'RISE') is worthy of mention, a roughly circular (50-60 m diameter) very low rise (to just over 10.5 m AOD), just east of BANK 1 and some 60 m from the northern boundary of the Proposal Site.

3.10 It may be noted that the topographic survey shown in Fig.OAA3 was constructed from a relatively uniform spread of readings at horizontal intervals in the range 20-50 m. It is possible that smaller/finer scale residual earthworks may also survive.

4. HYDROLOGY

4.1 The positions of the seven boreholes from which hydrological data have been recovered are shown in Fig.GR4; the data (supplied by SECOR) are tabulated below and shown graphically in Fig.OAA1.

STANDPIPE MONITORING RECORDS

Bore-hole	Height of standpipe (m)	RL of top of standpipe mOD	07-10-96		26-11-96		18-02-97		27-05-97		18-08-97		10-09-97	
			Water level (bgl)	RL of water mOD	Water level (bgl)	RL of water mOD	Water level (bgl)	RL of water mOD	Water level (bgl)	RL of water mOD	Water level (bgl)	RL of water mOD	Water level (bgl)	RL of water mOD
1/96	0.95	11.60	1.55	9.10	1.50	9.15	1.04	9.61	1.09	9.56	1.02	9.63	1.00	9.65
3/96	0.75	12.10	1.80	9.55	1.75	9.60	1.31	10.04	1.42	9.93	1.29	10.06	1.33	10.02
7/96	0.55	11.34	1.95	8.84	1.95	8.84	1.56	9.23	1.63	9.16	1.52	9.27	1.45	9.34
8/96	0.65	10.77	1.75	8.37	1.75	8.37	1.20	8.92	1.30	8.82	1.24	8.88	1.21	8.91
17/96	0.85	10.93	2.55	7.53	2.55	7.53	2.07	8.01	2.15	7.93	2.04	8.04	1.94	8.14
19/96	0.45	9.68	2.10	7.13	2.10	7.13	2.13	7.10	2.09	7.14	1.94	7.29	1.99	7.24
20/96	0.35	9.34	1.55	7.44	1.45	7.54	1.07	7.92	1.27	7.72	1.14	7.85	1.06	7.93

4.2 Leaving the Borehole 19 readings aside for the moment, the remaining six records are highly consistent. Each graph shows a very similar pattern over the measurement period and the mean range is 0.54 ± 0.04 m. These data (particularly the low standard deviation) would suggest good hydraulic continuity in the main aquifer across the Proposal Site, probably with reasonably uniform hydraulic conductivity (permeability) characteristics.

4.3 SECOR report that an attempt to measure hydraulic conductivity by pumping (falling head method) failed due to the relatively high permeability of the deposits (i.e. water dispersed into the deposits as fast as it could be pumped into boreholes). A standard empirical method was therefore used to calculate likely hydraulic conductivity from the particle size distribution of the deposits, giving an estimate of c.200 m/day; since the aquifer deposits within the Proposal Site are quite uniform in texture, it is reasonably assumed that the hydraulic continuity will be similarly very high throughout.

4.4 Borehole 19 shows a different pattern from the other monitoring points, in that the water levels remain more or less constant (a range of only 0.16 m). The actual mean level over the measuring

period in Borehole 19 is 7.17 ± 0.08 m AOD, which is more or less the same level as that observed in the adjacent King Street Drain, suggesting that, under current conditions, the Drain is able to evacuate ground water efficiently (with little longer term variation in free water level) and is thus acting as a stable base level for the flanking Proposal Site. The land in proximity to Borehole 19 would therefore be more or less free-draining (high hydraulic conductivity).

4.5 Some 500 m to the northwest of the Proposal Site, the West Glen River flows in a northeasterly direction; SECOR report bed elevations of at c.12 m AOD in Greatford, falling to c.9 m AOD approximately 1 km north of the Proposal Site. SECOR note that, since the West Glen River appears to be in hydraulic continuity with the ground water, it is likely that the river will be losing flow to the gravels to the east (including those within the Proposal Site). Between the river and the King Street Drain (and thus across the Proposal Site), observations suggest a reasonably smooth hydrological gradient of c.0.0025. Such a gradient is relatively high, given the high hydraulic conductivity, suggesting that water levels reflect a partially closed loop, with continual seepage from the West Glen River, rapid passage through the intervening gravels and equally rapid evacuation by the King Street Drain (which flows north to rejoin the river at Kate's Bridge).

4.6 SECOR have compared the gradient of 0.0025 across the Proposal Site to the gradient of only 0.001 observed from various water features and records for the area east of King Street (cf. the regional estimates of February ground water contours shown in Fig.GR8 as well as the regional gradient of the underlying Oxford Clay aquiclude). They deduce that the construction of the King Street Drain may have reduced ground water levels in proximity to the Drain by as much as 1.5 m. This would be consistent with the concept of the partially closed loop, noted above, although such an extreme reduction would imply former 'wetland' surface conditions (vegetation and deposits) alongside King Street, conditions for which there is absolutely no direct evidence at present.

4.7 The comparison is of interest between the pairs of readings, on the one hand, for October and November 1996 and, on the other, for August and September 1997. The two pairs do not overlap in time but they both fall within what one would expect to be the generally 'drier' part of the year. However, using the six main boreholes (leaving Borehole 19 aside), the mean difference in the two

pairs is 0.49 ± 0.06 m (that is, the 1997 figures are, on average, 49 cm higher). Whilst the 1997 pair fall a little earlier in the year, perhaps before the annual low ground water level, the difference appears to be too great not to be significant (it is not far off the mean range for all readings from these six boreholes). Two possible causes might be envisaged.

4.8 First, the levels in Borehole 19 may provide a clue as to the cause of this situation, since, even here, the 1997 pair are 14 cm higher than the 1996 pair, whilst the whole range in Borehole 19 in the period October 1996 to May 1997 (including the 'wet' season) was only 4 cm. It was argued above that the Borehole 19 levels are very stable due to equilibrium with the King Street Drain. The last two readings at Borehole 19, being unusually high, might therefore indicate that the August and September 1997 data were each inadvertently collected a day or two after strong rainfall in the overall catchment (including that of the West Glen River), when the Borehole 19 level had not yet reached equilibrium with the Drain and when all borehole levels were still unusually high.

4.9 Second, it may be that there has been a bulk meteorological difference between 1996 and 1997 (or, more precisely, between the weather condition leading to the ground water cycle ending in the 'high' of February 1997 and the cycle which will end in the 'high' of February 1998); the second 'year' may simply be significantly wetter.

4.10 Meteorological data for the vicinity would be needed to decide which of these two possibilities is the dominant cause. In any case, it is stressed that, no matter what the absolute water levels, exactly the same general pattern between boreholes is seen in the whole data set (see Fig.OAA1), confirming the conclusions concerning hydraulic continuity and conductivity.

4.11 Since the surface topography is more variable than the water table within the Proposal Site, the depth to water level below surface will also be variable. The mean depths below surface for the entire monitoring period are as follows: Borehole 1 - 1.20 ± 0.25 m; Borehole 3 - 1.48 ± 0.23 m; Borehole 7 - 1.68 ± 0.22 m; Borehole 8 - 1.41 ± 0.27 m; Borehole 17 - 2.22 ± 0.27 m; Borehole 19 - 2.06 ± 0.08 m; Borehole 20 - 1.26 ± 0.21 m. Borehole 1 shows the most shallow single depth reading (1.00 m) in the September 1997 (1.04 m in February 1997), whilst Borehole 17 shows the deepest level

(2.55 m); the slightly less deep figure (around 2.10 m) for Borehole 19 may be artificially deep, since this location may be on the edge of the built *agger* of the Roman Road. In the 'driest' month of the 1996 cycle (October), the mean depth below surface in the six boreholes (excluding Borehole 19) is 1.86 ± 0.37 m; in the slightly earlier point in the 1997 cycle (September) the mean is 1.33 ± 0.34 m, a difference in keeping with the bulk difference between these two cycles already noted. The two depth estimates represent the maximum 'average' expected depth of the more or less permanently saturated zone within the main (gravel) aquifer; it is not yet clear which figure should be considered to be the more typical in the longer term.

4.12 The dates of the two sets of RMC boreholes in 1988 are unfortunately unknown; in one set ('M') water was struck at depths below surface of 1.0-1.8 m (presumably a wetter season) but in the other set ('A') water was struck at 2.3-3.7 m below surface (presumably a drier season). Water strikes are usually lower than true rest water levels but the c.1.5 m difference between the two strike sets suggests a greater seasonal variation in 1988 than in 1996 (differences between strike and rest water levels were <0.2 m in October 1996 but 0.4-0.5 m in February 1997).

4.13 Apart from the special circumstances of Borehole 19, none of the other 1996-7 observation points shows any greatly significant individual characteristics. Borehole 8, which lies on the edge of a slight surface depression, shows a high seasonal fluctuation in water level (0.55 m) with the February 1997 and the August/September 1997 levels approaching 1.2 m below the surface; however, it is possible (and even probable) that both the closing of the surface 'depression' and the slightly 'raised' (i.e. relatively raised with respect to the overall gradient) wetter season water table may be an artificial effect caused by the field margin (raised track and drain of BANK 2) which interrupts the natural topography just downslope to the east. Borehole 1, towards the northwestern corner of the Proposal Site, shows a similarly high fluctuation and levels approach 1.00 m from the surface in the same 'wet' periods. Borehole 17 shows the greatest fluctuation but the levels are always well below the surface.

5. AERIAL PHOTOGRAPHS

5.1 Various plots of marks seen on aerial photographs have already been produced for the Proposal Site and its vicinity.

5.2 The plot produced in the 1996 APS report (fig.7, not reproduced here) appears to derive mostly from sketch plots held in the County SMR, with some minor additions from actual photographic prints. Whilst qualitatively representative, this plot is not sufficiently accurate in location, geometry or detail to guide fieldwork.

5.3 A further sketch (RAC 5, not reproduced here) was made by Reading Agricultural Consultants, who noted a number of cropmarks which they interpreted (without attempting differentiation) as being due to either periglacial patterned ground or archaeological (cut) features.

5.4 The most authoritative (computer-rectified) plots have been produced by the Royal Commission on the Historical Monuments in England, although it is unfortunate that the composite for the vicinity of the Proposal Site (reproduced here as Fig.OAA2) comprises the work of two different sets of (experienced) AP interpreters working at different map scales (the N-S boundary between blocks TF11SW and TF01SE falling right across the middle of the Site). The RCHME plots have nevertheless been used as the most reliable basis for the present work.

5.5 Before continuing, certain points must be raised concerning the prior plotting and the nature of the aerial photographic evidence for this area.

5.6 First, there are no lists of photographs included in the database for any of the prior plots, preventing one from comparing the interpretations in detail.

5.7 Second, it is not always clear what individual interpreters have attempted to plot. The APS plot certainly contains quite a large number of features (mostly outside the Proposal Site itself) which we

would interpret as patterned ground (geological) and recent agricultural marks. The RAC plot is claimed to include patterned ground and archaeological features (undifferentiated); whilst we recognise some major archaeological features in this plot, we interpret some of the other lineations as sub-recent agricultural marks, those true geological features within the Site not having been commonly recorded by RAC. In theory, RCHME plots show only those features which the experienced interpreters feel are likely to be archaeological. However, in the present case, different interpreters have come to rather different conclusions over the origin of given marks, the criteria used to differentiate archaeological features not having been applied in a particularly consistent manner. In particular, the RCHME have plotted certain features as archaeological up to the edge of a given field and/or photograph run, but have not plotted the very obvious continuation of the same features onto neighbouring land.

5.8 The OAA examination of photographs held at RCHME Swindon (cf. list appended to this report) leads us to conclude that, whilst known photographs covering the general vicinity of the Proposal Site are relatively numerous, the actual areal coverage is patchy and the responsiveness to cropmark formation (a derivative of season, crop type, soil type, etc.) is generally poor to extremely poor. We would therefore warn that, unlike the area to the east of King Street (which seems to be highly responsive to cropmark formation), archaeologically significant features may be present in the vicinity of the Proposal Site which do not show on available aerial photographs. We would also note (as, no doubt, would APS, RAC and RCHME) that differentiation between more subtle archaeological features and geological features in this vicinity is extremely difficult (mostly because of the very discontinuous nature of most linear marks), leading to significant uncertainty in some instances.

5.9 The interpretation of aerial photograph data for the Proposal Site given in Fig.OAA3 is a combination of the RCHME plotting (scaled up form the original 1:10,000 or 6-inch) and sketch plotting by OAA from relevant photographs in the National Library of Air Photographs (RCHME Swindon). As such, Fig.OAA3 is somewhat more accurate than the original APS sketch but we would still expect fieldwork (including geophysics) to provide more precise data.

5.10 Only the more obvious, major features of probable geological origin are shown (blue) in Fig.OAA3. Diagnostic characters include triple-junctions or 'Y-forms', irregular line often with localised and abrupt lateral displacements, width variations over short distances and (in the best photographs) longitudinal tonal banding within the width.

5.11 Archaeological marks fall into three categories: broad, diffuse yet continuous marks; sharper, linear and curvilinear marks; and parallel S-form sets.

5.12 The broad, diffuse marks correspond exactly with BANKS 1-4 already recognised, within the Proposal Site, from their surviving low surface topography. The actual expression of any given mark varies with different years and seasons, and within different fields. Thus, the marks may be differentially light or dark, or both (in the last case, usually with the dark strip west, upslope, of the light strip). RCHME plotted one stretch only of BANK 1 in the fields immediately to the northeast of the Proposal Site. However, all these features are relatively clear on aerial photographs. What is more, they nearly all run continuously for several kilometres across the landscape (neither termination of BANK 1 was seen within the c.4 kilometres extent of photographs examined during the present study). It has already been noted above that BANK 5 (only very poorly represented as a mark on aerial photographs) is probably part of the Roman *agger*.

5.13 Most of the sharp linear marks are likely to represent the buried agricultural ditches. RCHME had already plotted many such marks (red) north of the Proposal Site. Having carefully examined the relevant photographs, OAA have added further linears (pink) consistently using exactly the same criteria as RCHME, although it should be noted that the photographs are poor and at least some of these marks (both RCHME and OAA plots) may incorporate geological features.

5.14 Rather more complex marks (small enclosures and other features appended to double-ditched features interpreted as trackways) constitute the Scheduled Ancient Monument, south of the Proposal Site. Further complex marks occur within the northern part of the western field of the Proposal Site, extending a little northwards beyond the Site.

5.15 One of the main organising features appears to be a (partially) double-ditched trackway (with a second such feature only fractionally impinging upon the northern boundary of the Proposal Site). Southwards from this trackway are appended two enclosures, one larger (easterly) and one smaller (westerly). The larger enclosure gives a particularly good cropmark, usually surviving strongly (with a width of 1-2 m) even in seasons when nearly all other marks have been parched out (cf. Figs. OAA4 and OAA5); this probably indicates that the ditch survives to a greater depth than that of the other ditched features in the vicinity. It is of interest that this enclosure includes the slight RISE noted in the topographic survey. There appears to be an entrance roughly in the centre of the eastern ditch, and there are traces of a possible addition trackway leading back ENE to the main route. There are no obvious buildings within the enclosure but there are a number of clear 'point' marks, both within the ditched area and just beyond (especially to the east), which also persist under parched conditions, suggesting relatively deep pits. The smaller enclosure has no particular distinguishing points and parches out as quickly as does, for instance, the main trackway.

5.16 Down the eastern side of the western field of the Proposal Site, there are three more or less 'closed' features. The most northerly, and by far the most convincing, is a relatively large, circular ring-ditch (perhaps 40 m in diameter) which lies partially under the western edge of BANK 2 (and may have been cut by the modern drain). Some 100 m further south is a mark which RCHME mapped as a rather angular, open feature but which OAA judge (from the poor photographs) to be almost closed and possibly circular enough to be another ring-ditch. Further south still (just south of the former, sub-recent field boundary), RCHME plot a U-form adjacent to a linear ditch, although, on available photographs, this curved mark is not particularly convincing; APS have reported a double-ditched circular feature approximately at this point.

5.17 The parallel S-form sets are the ploughed-out traces of ridge and furrow cultivation. Such traces are poor and sparsely represented in this vicinity; geophysical survey should be capable of identifying the weaker traces one would expect over much of the area.

6. CONCLUSION

6.1 The near-surface geology of the Proposal Site is relatively uniform. There appear to be two separate bodies of fluvial sands and gravels, with a clear margin between the two depositional troughs. For the sake of elimination, it is noteworthy that this margin seems to have no surface expression (either in topographic terms or as a cropmark); in particular, this margin does not underlie (and thus does not contribute to) either of BANKS 1 or 2 (see below).

6.2 The sands and gravels are coarse and permeable. The main ground water body (in the coarse mineral) is fast-moving and continually replenished from an open river (West Glen River). It is probable that these waters are highly oxidising, providing an unlikely context for organic preservation of archaeological significance. If one takes October 1996 as typical of long term low water level, only cut features surviving in excess of c.1.5 below the current surface might fall within the more permanently saturated zone. However, using the August/September 1997 figures, levels in the range of 1.00-1.25 m below the surface might represent the more permanently saturated zone in the lower (surface altitude), northern part of the western field. Better sealed, fine-grained, very local contexts (such as a ditch fill) might provide better points of preservation in their lower levels (cf. the larger enclosure and pits in the western field, the cropmarks of which had not parched out in July 1976). However, the moisture regime in such localised, less permeable deposits is largely a matter of direct moisture balance (direct rainfall v. evapotranspiration), rather than fast aquifer fluctuation (whether natural or man-induced); it is believed that this area is usually in overall moisture deficit, so that even finer ditch fills may have at least a seasonal tendency to dry out, the more so the shallower the fill survival.

6.3 It should be noted that iron panning is often observed (at points all along King Street, not just within the Proposal Site) well above the present water table, probably indicating a drop in the latter over the last few centuries (possible due to, or at least exacerbated by, the King Street Drain). The common survival of limestone suggests that this effect is not simply due to podzolisation. On the other hand,

the generally calcareous nature of the deposits is likely to favour the survival of bone and carbonate-tempered ceramics.

6.4 The certainly and potentially archaeological features so far recognised are unlikely to be restricted to a narrow time range. There are only three sets of features for which a likely broad date is yet available.

6.5 First, the two clear enclosures and trackway in the western field are of a form most probably dating from the later Iron Age to Romano-British period. APS have reported, after a field visit, that linear cropmarks (observed actually from ground level as significantly enhanced growth of crop), both within the larger enclosure and immediately to the south and west; significant quantities of Roman pottery fragments, animal bones, oyster shells, limestone fragments and roof tiles (*tegulae* and *imbrices*) were observed in topsoil around this enclosure, which strongly suggested to APS the presence of a Roman building. This interpretation is consistent with the more northerly cropmarks within the SAM immediately south of the Proposal Site, which appear to be of a similar age.

6.6 Second, the clear ring-ditch towards the northeastern corner of the western field (against BANK 2) is most probably the remains of a Bronze Age barrow, although Anglo-Saxon (and even Roman) examples are not unknown.

6.7 Third, the traces of ridge and furrow cultivation date from the Medieval or earliest post-Medieval period.

6.8 The remaining potentially archaeological features fall into three groups, leaving a number of enigmatic, smaller features aside until more information is available.

6.9 The first group comprises the sinuous residual banks (BANKS 1-4). APS noted BANKS 1 and 3 in the field, and suggested that they are likely to be the remains of headlands between Medieval land plots ('furlongs'); such an explanation has usually been the 'default' for such features in the region. There is indeed clear cropmark evidence that BANK 1 has ***functioned*** as a headland; on the other

hand, ridge and furrow clearly passes straight across BANK 3. Also, the great linear extent (several kilometres) of these banks would be extremely unusual for Medieval headlands, which are opportunistic, even inadvertent, features, related to the choice of ploughing orientation and commonly continuous over only a few hundred metres (across the 'head-and-tail' of a few neighbouring furlongs). On the Rectory Farm site (West Deeping), Roman burials were recovered clearly dug into similar banks. In the vicinity of the Proposal Site, where the view is not obscured by a modern track/drain, linear cropmarks of apparent cut features (filled ditches) sometimes pass straight across banks, with no obvious weakening of the surface mark, a characteristic which would be hard to explain if the banks were simply accretive Medieval headlands. An alternative hypothesis is offered here, namely that these banks have their origin as much more ancient features, possibly dating from the Bronze Age or earliest Iron Age, and possibly related to the loose category of archaeological features lumped under the (often misleading) title of 'triple-ditches'.

6.10 The second group comprises the numerous linear features which, if interpreted as a coherent pattern, resemble a co-axial field system. These features do not generally respect either the banks noted above or the modern field layout. One would reasonably assume (from general analogy with dated examples from all over the country) that this pattern is of Iron Age to Romano-British date. However, it should be noted (a) that some of these features may not be archaeological and (b) that both Neolithic and Bronze Age field systems are known from the Deepings area. The currently available aerial photographic evidence is simply not sufficient to substantiate a likely date or dates, or even the reality of the 'pattern'.

6.11 The third group comprises the pit-form cropmarks, which could be of any age(s); in this connection, it should be remembered that the only substantial cut features of many Neolithic occupation sites in this region are often pits.

6.12 We would make the following recommendations over issues which could be addressed during field evaluation:

(a) The likely archaeological features in the northern and western parts of the western field are an obvious primary target for magnetometry (in passing, we would note that a careful

allocation of the magnetometry contingency will be necessary in order to achieve a representative sample of as many relevant points as possible within the Proposal Site). The possibility of a Roman (period) building within the larger enclosure should be addressed, if feasible. Minimal augering could be used to discover whether the slight RISE within this enclosure is a natural topographic feature (attractive for settlement simply because of its drainage advantages) or, is a 'built' or 'enhanced' feature incorporating archaeological debris. At the same time, the possibility of a palimpsest of features of various ages in this zone should be borne in mind. Of particular interest will be the areas in which cut features cross or impose upon BANK 1. If the RISE is a natural feature, it may have attracted human activity during several periods, whilst the step in BANK 1 in this zone (if this feature is indeed ancient) may also be suggestive of a persistent focus. It is not yet known whether the large ring-ditch is an isolated example or part of a barrow group.

(b) Once the larger enclosure and neighbouring pits have been exactly localised by geophysical survey, a small number of tests could be carried out by hand auger in order to assess the depth and fill type (especially in connection with the possibility of moist organic survival).

(c) It would be advantageous if sections of the main trackway (northern boundary of the Proposal Site) and of the main ring-ditch (eastern margin of the western field) could be examined in the modern ditch sides. Similarly, there are several points right across the Proposal Site at which possible linear marks intersect with modern ditches; observation would provide a test of their true origin.

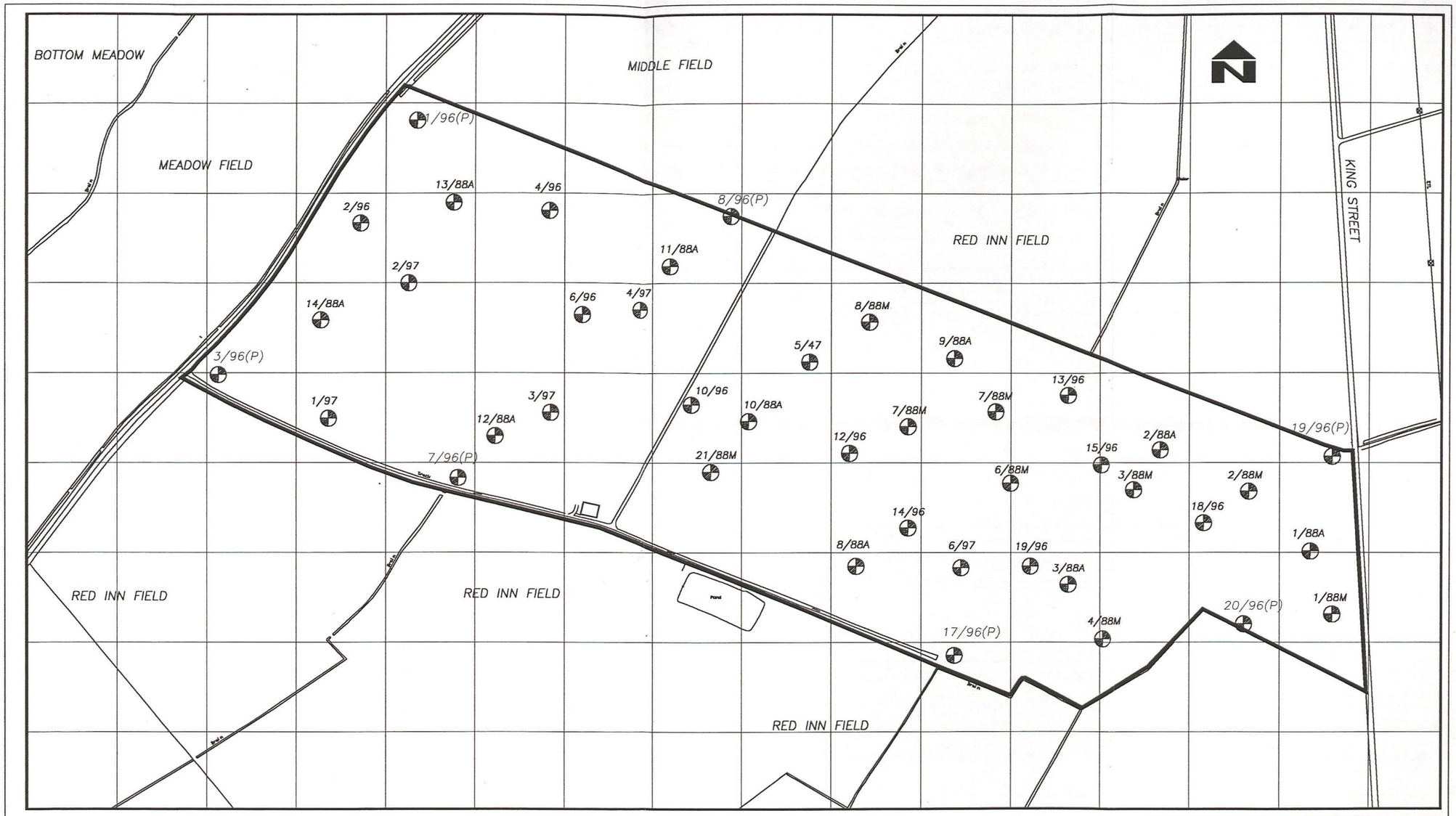
(d) A number of profiles could be constructed across the banks (particularly BANKS 1 and 3 which appear to be the most extensive and least disturbed), combining the surface topography, a series of short auger logs and interpretation of any associated geophysical anomalies. It will be especially important to discover whether there are any filled longitudinal ditches (for which there is currently no cropmark evidence) in association and whether the banks overlie a recognisable surface or palaeosol. Again, ditch exposures at the northern and southern boundaries of the Proposal Site may be of interest.

(e) As noted in the fieldwork specification, any additional residual earthworks should be plotted. It is reiterated that the current site-wide topographic survey, whilst quite detailed, would probably not recognise narrower or lower features than the main banks already recorded.

(f) Whilst both fieldwalking and magnetic susceptibility survey will help to localise any as yet unknown archaeological concentrations, the results from these techniques should prove most interesting with respect to broad landscape organisation. For instance, it remains to be seen whether topsoil finds (by density, period and/or functional type) and broad magnetic anomalies relate in any way to compartmentalisation produced by either the banks or the possible co-axial field system(s).

FIGURE CAPTIONS

Fig.GRA4	Borehole Locations (Ennemix/SECOR).
Fig.GRA5	Sand & Gravel Isopachytes (Ennemix/SECOR).
Fig.GRA6	Oxford Clay Surface Contours (Ennemix/SECOR).
Fig.OAA1	Graphic representation of ground water levels (see tabulated levels in text); data supplied by SECOR.
Fig.OAA2	Archaeological cropmark plots (Royal Commission on the Historical Monuments in England, Crown Copyright) [in the slight mismatch across Easting 100, priority has been given to cropmark continuity over NGR accuracy].
Fig.OAA3	Composite mapping of topographic and aerial photographic data.
Fig.OAA4	Aerial Photograph JAP1405/07, TF 09 12 / 5, 31.07.77 (Crown Copyright).
Fig.OAA5	Aerial Photograph NMR963/245, TF 10 12 / 2, 11.07.76 (Crown Copyright).
Fig.OAA6	Aerial Photograph 543/2337, 2165, F21 439, 30.07.63 (Crown Copyright).
Fig.OAA7	Aerial Photograph 543/2337, 2165, F21 440, 30.07.63 (Crown Copyright).
Fig.OAA8	Aerial Photograph NMR1135/343, TF 10 12 / 4, 30.06.77 (Crown Copyright).
Fig.OAA9	Aerial Photograph MAL/65093, 4241, V 033, 03.11.65 (Crown Copyright).



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LEGEND

14/88A	SHELL & AUGER BOREHOLE RMC 1988
12/88M	POWER AUGER BOREHOLE RMC 1988
7/96	FES 1996
2/97	OAKLEY SOILS 1997
(P)	STANDPIPE PIEZOMETER

ENNEMIX

Site: GREATFORD
Project: GEOTECHNICAL REPORT
Drawing: **BOREHOLE LOCATIONS**
Date: APRIL 1997
Scale: 1:5000
Drawing No. GR 4
4D/057/009/01

SECOR
WHEELEY RIDGE, WHEELEY RD
ALVECHURCH, WORCESTER
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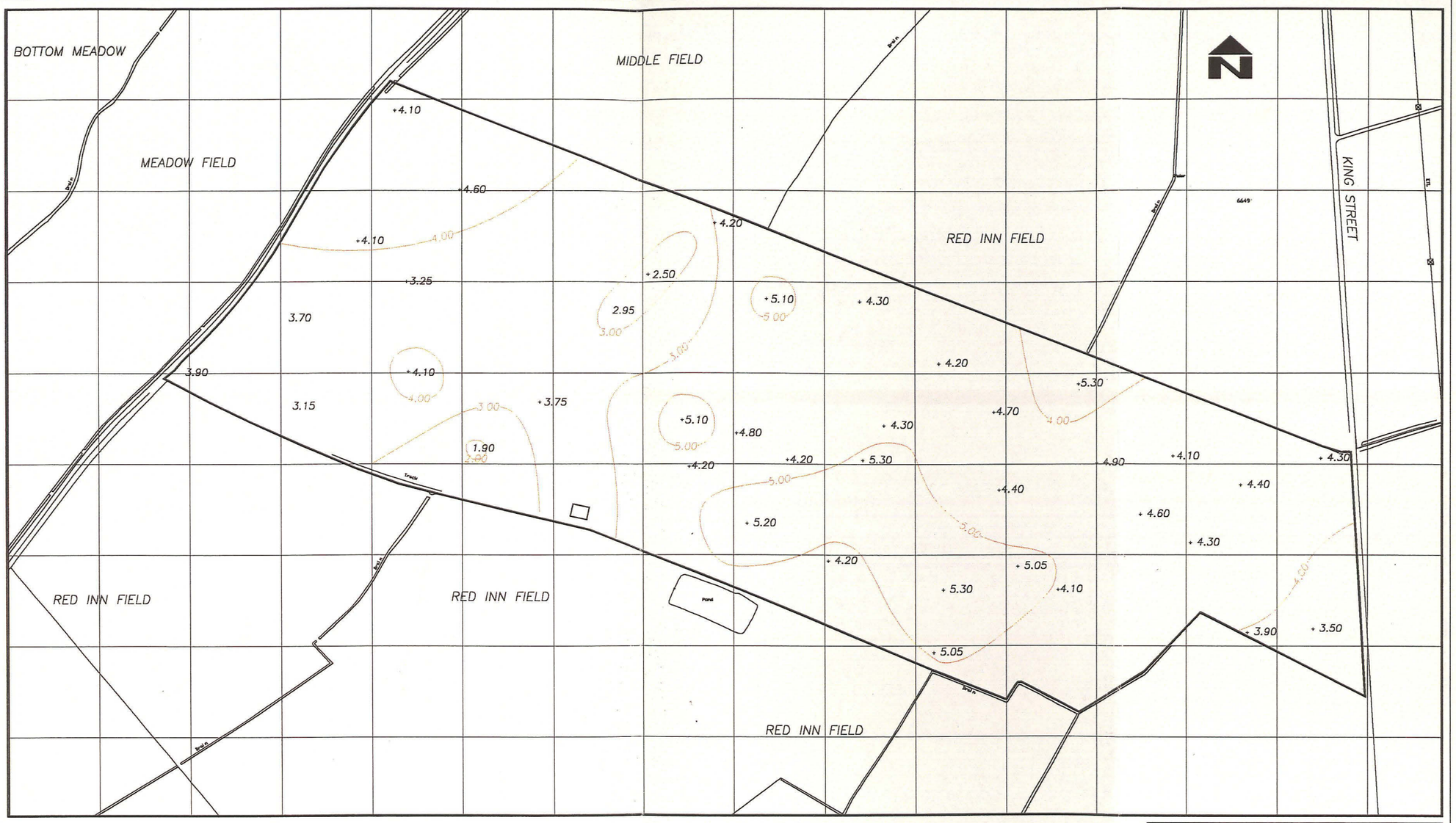

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5.05	OBSERVED THICKNESS OF SAND & GRAVEL
5.05	INTERPRETED SAND & GRAVEL ISOPACHYTES

ENNEMIX

Site	KING STREET
Project	GEOLOGICAL REPORT
Drawing	**SAND & GRAVEL ISOPACHYTES**
Date	APRIL 1997
Scale	1:5000
Drawing No.	**GR 5**

4D/057/009/01

SECOR
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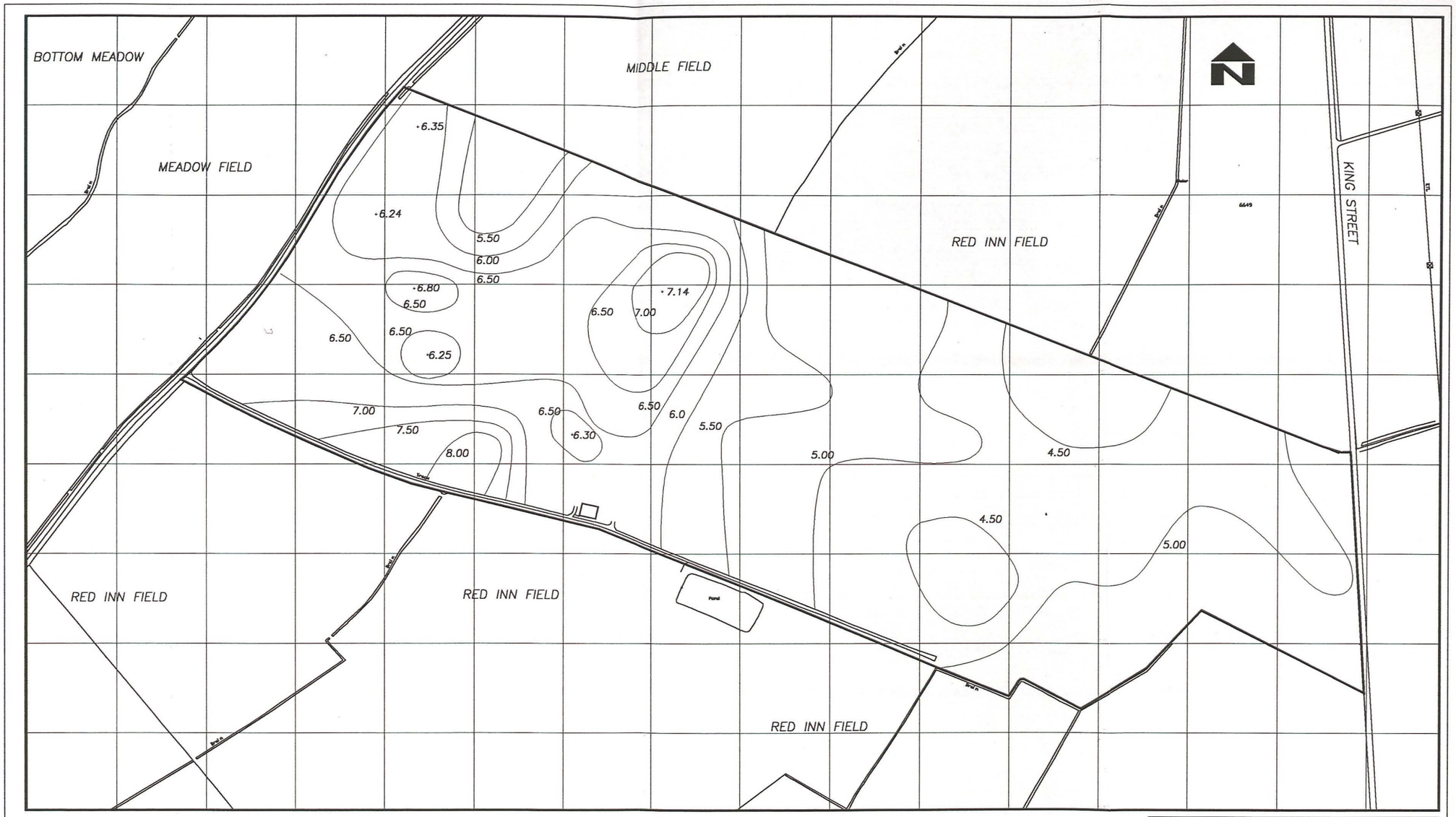

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ENNEMIX

Site	KING STREET
Project	GEOLOGICAL REPORT
Drawing	**OXFORD CLAY SURFACE CONTOURS**
Date	APRIL 1997
Scale	1:5000
Drawing No.	**GR6**

4D/057/009/01

SECOR
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ALVECHURCH, WORCESTER
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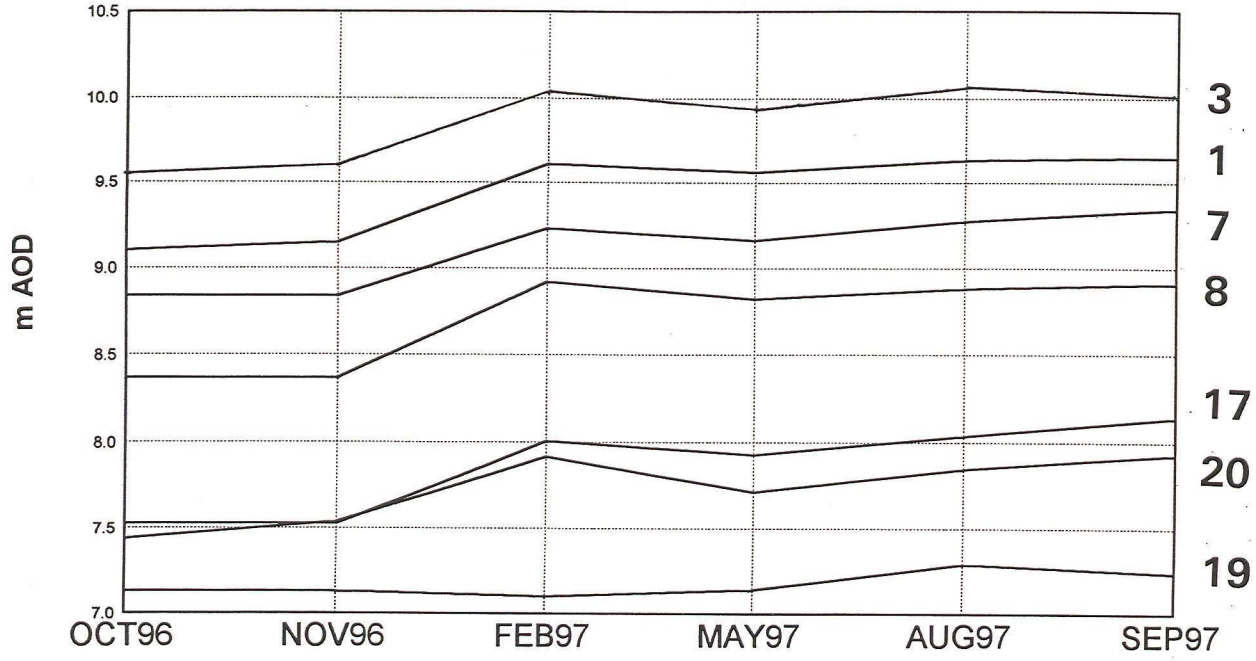
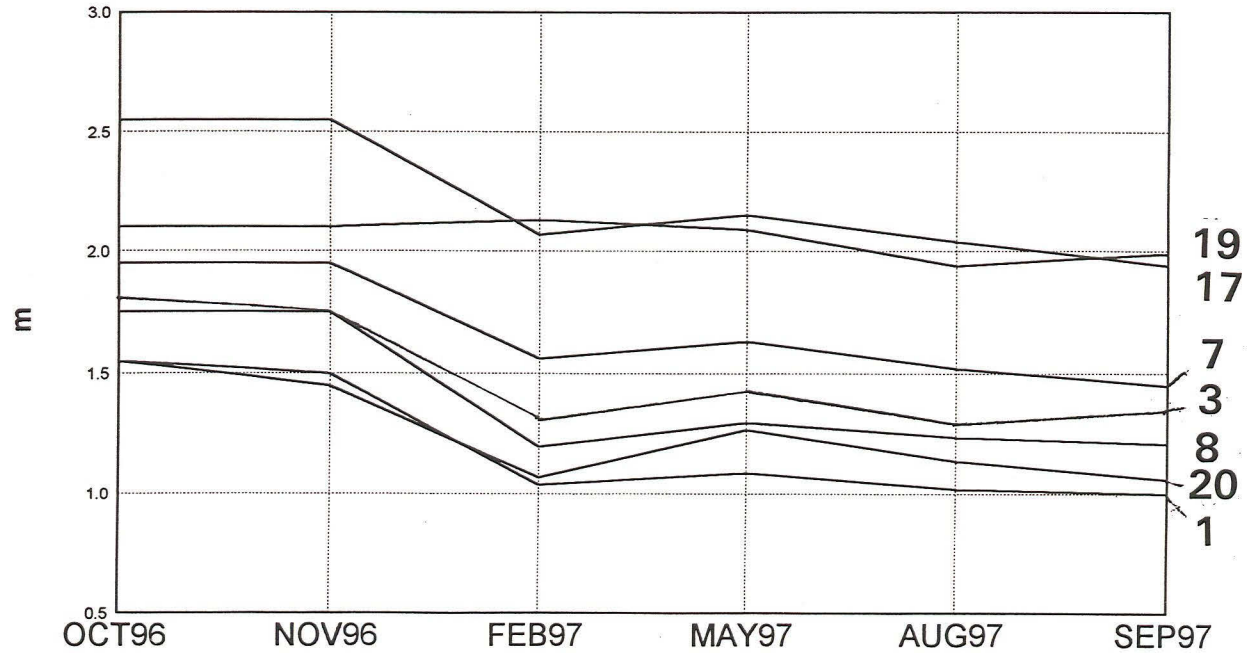
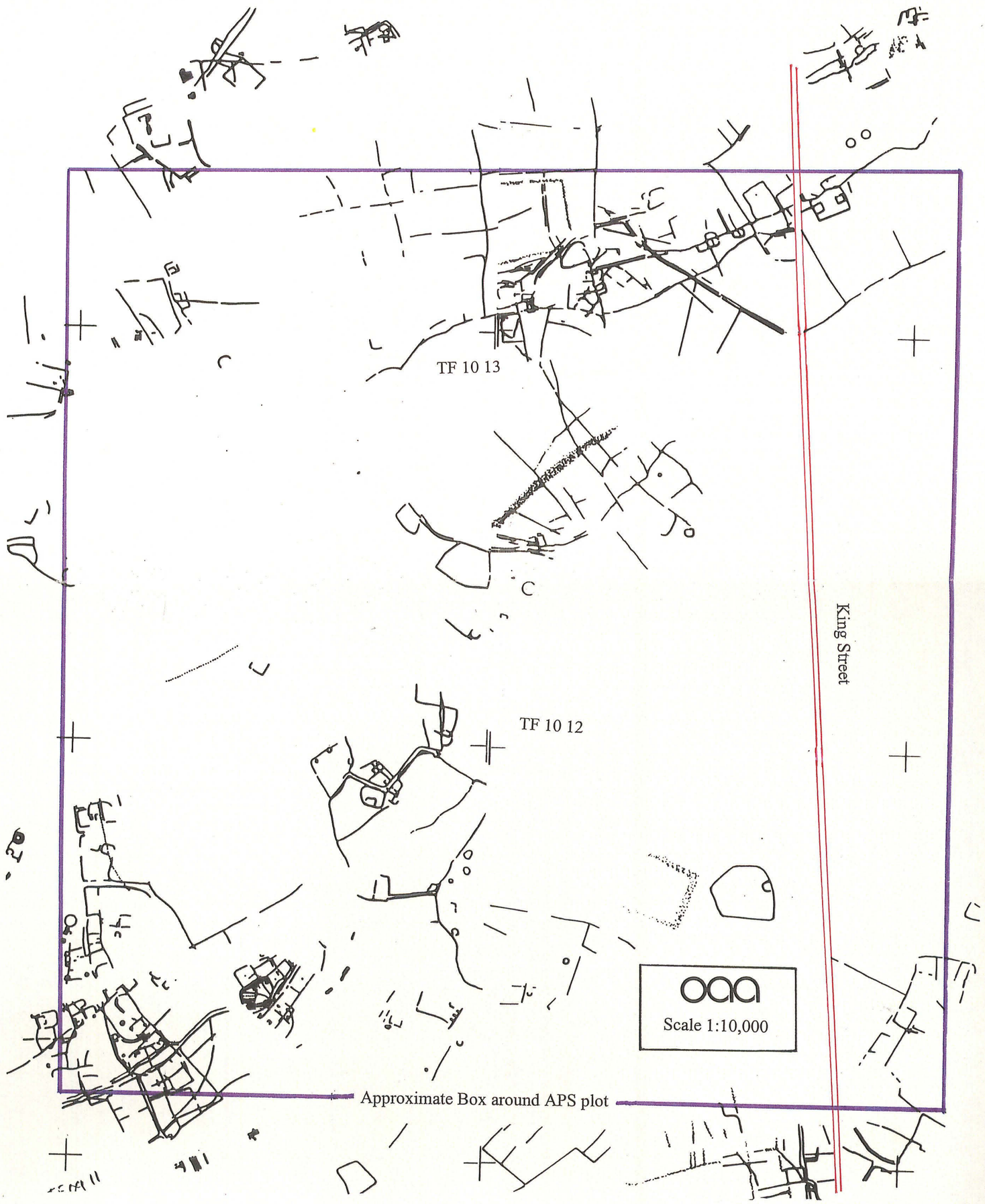
ABSOLUTE GROUND WATER LEVELS



GROUND WATER LEVELS BELOW SURFACE

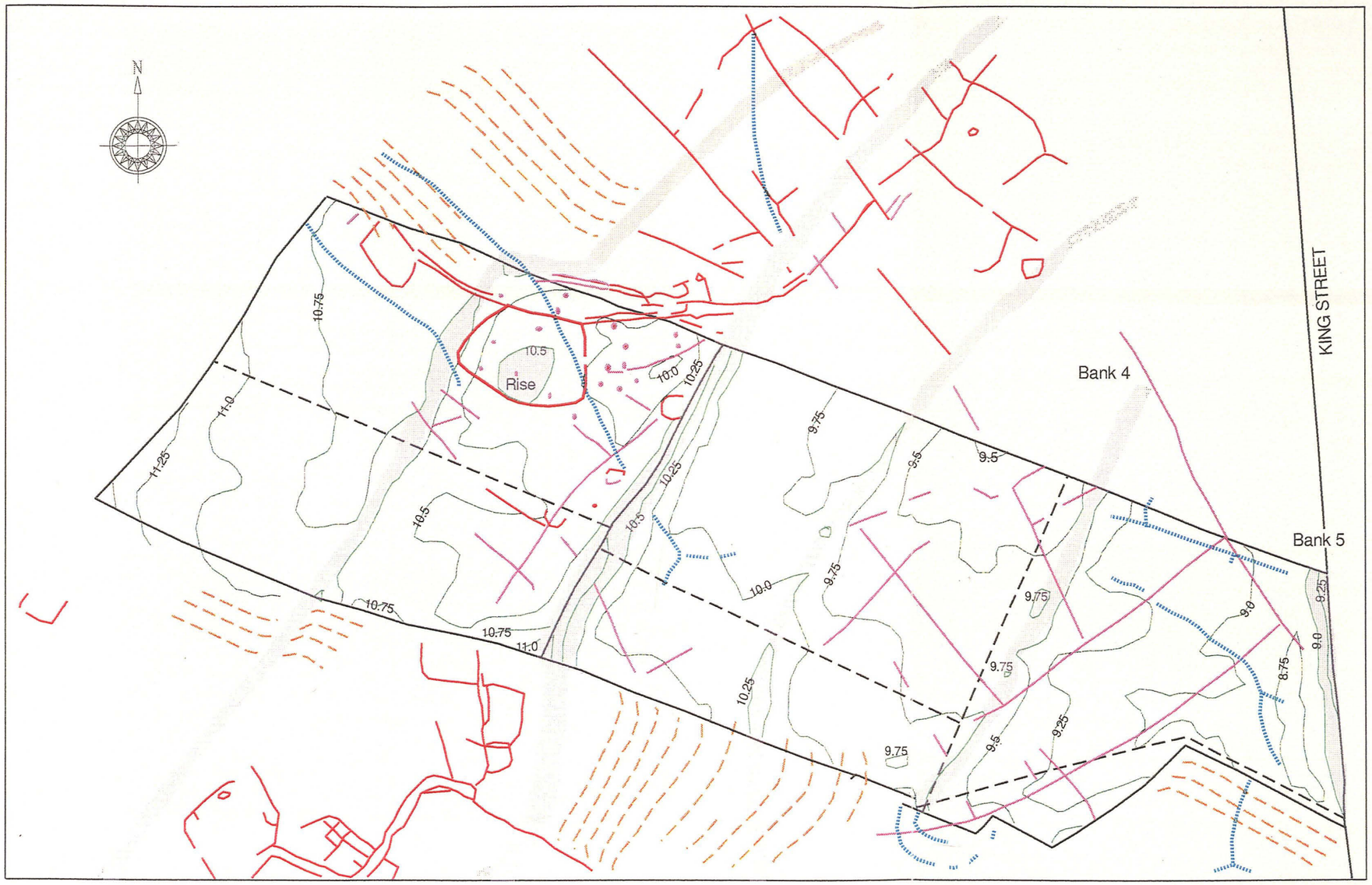


OAA1


TF 10 13
TF 10 12
King Street
oaa
Scale 1:10,000
Approximate Box around APS plot

OAA2

OAA3



Bank 1

Bank 2

Bank 3

SCALE 1:5000

KEY

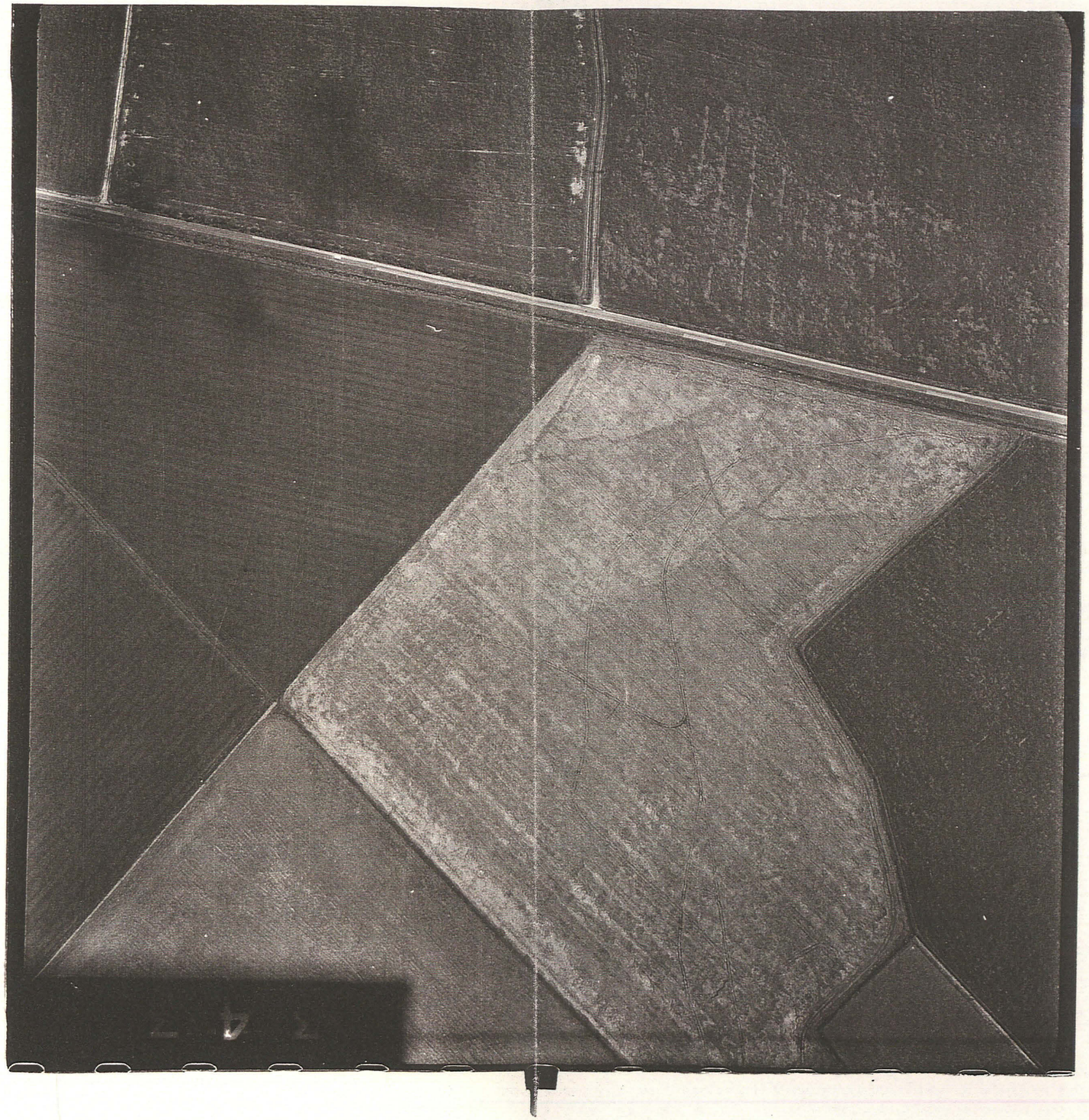
- Known former field boundaries & tracks (map evidence)
- Contours (m AOD)
- Probable geological features
- Probable archaeological cropmarks (RCHME plot)
- Probable archaeological cropmarks added by OAA
- Ridge and furrow
- Banks plotted by OAA / RCHME

OAA4

OAA5

OAA6

OAA7



MERIDIAN AIRMAPS LIMITED,
COMMERCE WAY,
LANCING, SUSSEX.

CONTACT SCALE
1:12,000

3 NOV. 1965
93/65

PETERBOROUGH

OAA9