2 Previous Work

Previous Holocene palaeoenvironmental work

Previous work on environmental data along the valley had been concentrated in a limited number of foci dictated by archaeological assessment, evaluation and subsequent excavation, concentrated in areas of greatest commercial value for aggregate. However, many areas were exploited prior to any structured archaeological response and as a result some areas were entirely quarried with only limited archaeological recording. Areas exploited for aggregate prior to the 1970s had little, if any, significant or detailed environmental recording or palaeoenvironmental analysis. Even up to the mid 1980s and the inception of the Raunds Area Project most environmental contexts were analysed in a limited fashion, with the possible exception of well deposits. This fragmentary record of research and unfounded and unpublished analyses provide the main *raison d'etre* for this study.

The Earls Barton-Grendon-Wollaston-Irchester Reach

An 8km length of the Nene Valley has had several sites excavated on both sides of the river (Last 2006) (Fig 1.1). Archaeological sites have been excavated in the Grendon area for many years (Gibson *et al* 1985, Jackson 1995) and Northamptonshire Archaeology (Jones and Chapman 2005). Recently, Hertfordshire Archaeological Trust with funding from RMC excavated sites associated with a palaeochannel (Last *et al* 2006). The site consisted of a section of a palaeochannel approximately 20m wide located at the south-eastern edge of the floodplain adjacent 250m from the gentle slope of the edge of the first and second terrace surfaces. Northamptonshire Archaeology mapped the same palaeochannel as part of the Wollaston excavations.

Details of the palaeoenvironmental work undertaken are contained in Brown and Hatton (2000, 2001) and summarised in Last *et al* (2006). These studies reveal that the chronostratigraphy and palaeoenvironmental record from the channel fill is more complex than might have been assumed on the basis of field observations (see section 4.4). The infilling of the palaeochannel began in the early Holocene pre-Boreal phase (*c* 9,500-8,000 cal BP). This suggests that the palaeochannel was probably of Late-glacial origin. Palaeochannels of similar age are common in the East Midlands, in both the Soar and Nene valleys (Brown *et al* 1994).

The base of monolith 2 (p.a.z. Gr. 2) clearly formed during the early Boreal period (Mesolithic) with its termination and zone boundary being a stratigraphic hiatus (H2), although there is also an earlier hiatus (H1) which is undated. The second hiatus covered the Mesolithic to the Early Bronze Age, although the erosion that was responsible almost certainly occurred in the Early Bronze Age BC. The radiocarbon dates suggest that zones Gr.3 and zone Gr. 4 are conformable and that they span a thousand years of deposition from the Early Bronze Age to the Middle/Late Bronze Age. The dates quoted here are interpolated cal BC dates for the pollen zone boundaries. The dry land mixed deciduous woodland on the surrounding slopes had been largely cleared by 1,430 cal BC. There is a subtle but significant clearance episode of floodplain woodland between 1,200 cal BC and 1,000 cal BC and another estimated as 650 cal BC. A particularly notable feature of the diagram is the high representation of scrub or hedgerow tree types. The upper sub zones of Gr.4 reveal a largely open landscape cleared of dryland trees with pasture, arable cultivation and hedges.

At Wollaston, to the north-west of the present town, excavations by Northamptonshire Archaeology (phases 1 and 2) revealed a large number of archaeological features spanning several thousands of years from the Neolithic to the Roman period. A palaeochannel, the cross-section dated to the Late Neolithic by radiocarbon dating (see section 4), ran along the north-western edge of much of the phase one excavation area. Further palaeoecological evidence came from Middle to Late Iron Age ditch deposits and Iron Age and Roman wells.

A series of Roman ditches, at first regarded as enigmatic have, through pollen analysis, been interpreted as part of a substantial Roman vineyard complex. It is likely that similar features at Grendon (Jackson 1995) and Wellingborough were also parts of vineyards (Brown *et al* 2000). What we see at Wollaston is an almost totally cleared pastoral landscape, subdivided by the middle Iron Age, which then had a Roman landuse pattern associated with villas and the surrounding towns imposed upon it. This is in line with the generally dense pattern of Roman settlement in the Nene Valley and a fully utilized floodplain and surrounding slopes (Wild 1974, Taylor 1975).

The Higham Ferrers-Irthlingborough-Stanwick Reach

The best present evidence of the age of the upper alluvium comes from the infill of a channel beneath a medieval metalled trackway covered by alluvium, which crossed the floodplain near Stanwick. Silts from the infill are dated by radiocarbon to 740-880 cal AD (HAR-8562). Plough damage of probable Iron and Roman Age date to the barrows at Redlands Farm, near Stanwick indicates that at that time the barrows were still upstanding and only later became buried by alluvium. The stratigraphic sequence at the Roman villa at Redlands Farm suggests the abandonment of a channel of the Nene prior to the Roman occupation. Alluviation over the demolished buildings dates to the late Saxon and medieval periods (Keevill 1992). Accelerated alluviation at West Cotton, dated to *c* 1150 AD, necessitated the construction of a flood bank in order to protect the settlement and also possibly caused the abandonment of the mill (Chapman in press). At both Redlands Farm and West Cotton, late Saxon or medieval ridge and furrow cultivation of the floodplain was sealed by extensive accelerated alluviation in the medieval period (Windell *et al* 1990, Keevill 1992).

Nearly the entire valley floor has been removed by gravel extraction, in most cases down to the Lias Clay and this has provided a large number of commercial boreholes and test pits in this reach. This has allowed the reconstruction of the fine alluvium (overburden) thickness from borehole records, and these have been hand-contoured (Halpin pers com) and displayed using various early methods of computer interpolation (Brown and Keough 1992).

A second method of locating palaeochannels has involved a watching brief during gravel extraction with appropriate stratigraphic sampling and recording. The individual environmental palaeochannel sites will be discussed in detail in other volumes of the Raunds Area Project series of reports (including the best preserved and most important at West Cotton) but Figure 4.18 gives a generalised cross-section for each. Because of the depth of the channels, the uniformity of the underlying gravel body (except for small areas of reworking), and the lack of depth of finds on the gravel islands, it is suggested that there has been incomplete lateral migration of the channel in the later Holocene. Together with the historical/present landform, meandering in pattern and multi-channel, it suggests that the predominant morphology has been an anastomosing channel system with old, dissected floodplain in between, upon which structures such as the Irthlingborough barrows could be constructed. This pattern of floodplain evolution is not unusual in lowland Britain where there are low regional slopes, non-flashy fluvial regimes and the system has been subjected to a net input of fine sediment (Brown 1987, 1997a). This style of floodplain channel evolution has been described by Brown and Keough (1992) as the stable bed/aggrading banks model (SBAB) and involves the reduction of the number of small channels in order to offset the increase in channel size that occurs as flow is concentrated in the remaining channels and as the floodplain surface aggrades. A rather similar floodplain and channel evolution has been documented for the Duck River in Tennessee, USA (Brackenridge 1984).

At Raunds the dominant processes of change have been channel siltation and floodplain alluviation, but not significant channel bed aggradation. The archaeological implications of this model included a much more complex channel pattern in the early to mid-Holocene with probably a larger area of water, though shallower, and more water edge which was of great value for fish and wildfowl, even though it was contained in a smaller area of active floodplain. The Irthlingborough barrows were built on an island of Devensian gravels (Garwood 1985), drier than at present, and they have probably always been isolated from the valley sides by river channels. The sedimentary sequence in the Raunds area suggests little or no seasonal flooding of the gravel islands during the Bronze Age, thereby providing a similar scenario to that described in the Upper Thames by Lambrick and Robinson (1984). The location of funerary monuments close to channel junctions has been noted elsewhere in the Nene floodplain (Keevill 1992) and could reflect a preference to use islands in a more complex channel pattern than exists today (Brown in press a).

There is little palaeoecological knowledge of the area other than for the floodplain. The nearest published pollen sites are from the fen edge to the north-east and certainly too far away to provide any information directly relevant to the Raunds area. From a spread of sites across the United Kingdom Bennett (1989) has recently produced a tentative forest map, referred to by the author as ‘approximately 5,000 years ago,’ which suggests that the south-east Midlands were covered by mixed deciduous forest dominated by lime and oak. Sites with palynological potential are unlikely to exist on the plateau, and in practice there are only two potential natural site-types in the area, the incised valley sediments and floodplain organics; so far only the latter have proved to contain pollen. Castleden (1976) cites pollen evidence from Ecton which suggests that by late Neolithic times (Godwin Pollen Zone VIIb) the pollen spectra were dominated by grasses and herbs denoting an open environment, although at the same site both hazel wood and nuts came from a channel deposit containing Beaker pottery. The pollen evidence from the site is unreliable, however, probably due to earthworm activity (cf Dimbleby 1975) and the date of the deposit, while containing Neolithic pottery, may have been modified more recently. Other sites in the Raunds area such as Redlands Farm and palaeochannel C suggest that forested conditions generally prevailed except for some islands (ie drier upstanding parts of the floodplain), which were clear, or cleared, prior to monument construction (Keevill 1992). A higher sample contains more oak suggesting a forested floodplain, but unfortunately precise dating is not yet available for the site. The two channel infills from Orton Longueville and Titchmarsh, further downstream, show that sub-regional forest clearance had already occurred prior to channel abandonment, as had local floodplain clearance. The Iron Age date assigned to these sites by Holyoak and Seddon (1984) is by no means certain, however.

In the previous work there remains a palynological gap between the late Devensian taxa lists published by Holyoak and Seddon (1984) and these post-clearance channel fills. Out of four palaeochannels sampled from the floodplain in the Raunds Survey area two are late (post-Roman), one is Pre-Boreal (E) while the other does pre-date forest clearance, with high alder, relatively high hazel (Coryloid pollen which can be assumed to be hazel in this environment), low herbs and no introduced species. Peat from basal fills of this channel were radiocarbon dated to 3370-2490 cal BC (4,300±150 BP; HAR-9241). Additional evidence comes from the discovery of *in situ* alder root clusters near to the pollen site, which are interpreted as the remains of alder woodland and have been dated to 4230-3800 cal BC (5,195±65 BP; SRR-3606). The evidence from the channel fill at West Cotton is complicated, but pollen from near the brushwood platform at the edge of the channel and dated to 2870-2460 cal BC (4,062±54 BP; UB-3321) also indicates a wooded floodplain dominated by alder, hazel and oak (Windell *et al* 1990).

In summary, these published sites suggest a period of widespread but localised vegetation change in the late Neolithic/early Bronze Age. This begs the archaeological question `why’? Was it related to the ritualisation of the floodplain as recorded by monument construction? The sites also show high spatial variability of Bronze Age vegetation and landuse which decreases appreciably into the Iron Age, when the floodplain seems to become an intensively exploited agricultural resource. By the middle-late Iron Age, the Nene floodplain was almost entirely deforested (possibly as much or more so than today) and intensively managed for stock with arable cultivation on the terraces and fringes.

In the early Holocene the floodplain soils were thin, sandy and stony with relatively free drainage. As on the lower Welland and Nene at the edge of the Fens (French *et al* 1992) the channel pattern was probably multiple (anastomosing) and may have developed from an earlier braided pattern. By the Atlantic period typical alder woodland had developed over the lower and wetter parts of the floodplain and overbank sedimentation may have begun in some areas. The dating of the abandonment of individual channels remains equivocal, since it is often a slow process whereby channels change in relative importance, silt-up and eventually only take flood flows. Channel E was abandoned in the early Holocene, but the West Cotton channel (which was probably part of the same channel system as both C and D) not only contained some sediments associated with the brushwood platform, but also evidence of later re-exposure followed by final infilling from the late Saxon period onwards. Whether the platform was built out into an active primary channel, or a secondary channel, or an oxbow with flow from the West Cotton tributary alone is unknown. Its re-exposure could be due to re-occupation of the channel by the main flow or flood flow. During the Bronze Age the gravel islands were still upstanding in the floodplain and were most likely surrounded by free-flowing channels. The increasing overbank deposition, especially in the medieval period, led to the development of pelo-alluvial gley soils. The channels have continued to contract (and deepen) due to bank aggradation since the removal of the floodplain woodland and in historical times the river has been canalised, engineered and managed.

Of particular note is the coincidence between the evidence of maximum erosion and deposition on slopes with the maximum alluviation on the floodplain floor in the medieval period (Brown 2006, Brown *et al* 2007). Since the Raunds area itself could not have supplied much of this alluvial sediment, the processes which caused the increase in sediment supply presumably occurred over large areas upstream at approximately the same time. The most likely explanation for this is the expansion of intensive arable cultivation, although the role of the known climatic changes of the period, in transporting material from field to floodplain, is as yet unknown.

A summary of current knowledge

On the basis of recent work at six new locations at Little Houghton, Grendon, Wollaston, Higham Ferrers, Raunds and Turnell's Mill Lane, and with the benefit of over 100 radiocarbon dates, it has been suggested that the bipartite sequence described by previous literature is in reality tripartite with a palaeosol, and occasionally fine sediments, sandwiched between the Devensian gravels and the superficial fine unit (Brown *et al* 1994). The evidence from tree roots suggests a mid to late Holocene change in floodplain conditions and *in situ* decay rather than fluvial erosion. The general pattern seems to be that of continued deposition and reworking of gravels into the late Devensian (with meandering in the late Devensian interstadial: Brown *et al* 1994), a lack of deposition and channel change in the early Holocene, then hydrological change, some abandonment of channels, and the overbank alluviation in the mid to late Holocene and greatly accelerated channel siltation and abandonment from the Saxon period onwards.

The present published evidence therefore suggests a palaeoecological history, not dissimilar from that of other Midland valleys, with alder migrating into a relatively open floodplain in the early Holocene and out-competing willow to form a dense alder woodland in the mid-Holocene, which was probably lost through human deforestation from the late Iron Age onwards (Brown 1988). Macrofossil evidence from the palaeochannel fills and other contexts suggests that the drier island locations may have supported oak, lime and hazel (Robinson pers com). A common problem arises here in that the polleniferous sites are those from the wettest locations where alder was dominant, and this causes a swamping-out of other floodplain and non-floodplain components of the flora. The most notable absence is that of lime, which has been shown to be dominant on river terraces elsewhere in the Midlands (Brown 1988). The pollen diagram from palaeochannel D in the Raunds area, shows that in the Roman period alder had largely been removed, with grasses dominating the diagram and scrub/hedge species such as elder appearing. This switch from wetland trees to species such as *Prunus* sp., hawthorn and elder is even more marked in the analyses of wood from palaeochannels by Keough (reported in Brown and Keough 1992). From the Roman period onwards both cereal and buckwheat pollen are persistent features in all of the later diagrams, until they decline in the very recent past. This record accords well with the evidence from Redlands Farm and elsewhere that after medieval cultivation most of the floodplain was given over to pasture and/or hay meadow. A very recent diagram from Mallows Cotton shows features which must be extremely local in origin including the planting of walnut, and the regeneration or planting of oak and willow.

Since the production of these pollen diagrams research has continued to the south at Wellingborough, Turnell's Mill Lane (Meadows and Brown 1996-97, Brown 1999), Wollaston (Brown 1999, Brown *et al* 2000) and Grendon (Last 2006). The Turnell's Mill Lane pollen diagram suggests that some deforestation of the local slopes had already occurred by the mid Neolithic, indicated by small declines in *Quercus*, *Tilia* and *Ulmus*. The floodplain at the time was still covered with alder-hazel-oak woodland. There is also a pronounced deforestation event dated to the Neolithic/Bronze Age boundary, an interesting characteristic of which is a peak of *Pteridium* (15% TLP) suggesting that the clearing was not heavily grazed. At Wollaston (2km upstream of Turnell's Mill Lane) pollen spectra from Iron Age contexts show no trees (2% TLP) and are dominated by grass, herbs (especially disturbed ground indicators) and cereal-type pollen. This confirms the archaeological evidence of an Iron Age landscape of linear farmsteads aligned to the limit of seasonal flooding. Part of this landscape (Wollaston I) was converted into a large vineyard during the Roman period (Brown *et al* 2001). A similar picture is emerging from Grendon (adjacent and upstream of Wollaston). Here a palaeochannel has revealed a complex sequence with three hiatuses and deposition in the Mesolithic, Neolithic/Bronze Age and Iron Age. Sediments from the later period (pollen sub zone Gr4) reveal an open landscape cleared of dry land trees with pasture, arable cultivation and hedges (Last *et al* 2006).