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NORTON BIG WOOD EXTENSION
NORTON DISNEY, LINCOLNSHIRE

ARCHAEOLOGICAL ASSESSMENT
&
SITE RECONNAISSANCE

Produced by Oxford Archaeological Associates Limited
under the direction of

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Commissioned by
RMC Aggregates (UK) Limited
on behalf of
RMC Aggregates (Eastern) Limited

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1. SCOPE OF ASSESSMENT

1.1 Following a Planning Application by RMC Aggregates (UK) Limited for a northern extension to the existing Norton Disney Quarry, Lincolnshire (Application No. N47/0505/99; cf. RMC Aggregates (Eastern) Limited, 1999), Oxford Archaeological Associates Limited were commissioned (after a request for background information from the County Archaeology Section) to write an appraisal of the archaeological potential of the land under Application, in conjunction with the submission of an Environmental Statement.

1.2 On the 26th. May 1999, the County Council issued a Screening Opinion, which included the following paragraph relevant to archaeological and historical matters:

> 5. Norton Big Wood and its neighbouring woods contain earthworks reflecting past changes in land use and as such contain information on the changes in the historical and cultural landscape and information on the vegetational development and plant colonisation in an area of contrasting soils where fluvio-glacial deposits are spread within a clay vale. The area of proposed extraction contains probably the best of the ridge and furrow systems. The exact nature of the earthworks has not yet been established in Norton Big Wood as the archaeological evaluation undertaken to date did not extend into this area.

1.3 For ease of reference, the appraisal (Griffiths & Collcutt 1999) has been fully integrated into the present text, with modifications only as has proved necessary in the light of subsequent work (see below). The appraisal is restricted to the Application Site and its immediate environs, although details of the historical and archaeological interest of a much larger area may be found in the references listed at the end of this text.

1.4 Upon submission of the appraisal to the County Archaeological Section, it was agreed that a field reconnaissance of the woodland should be conducted, in order to assess the potential for the survival of earthworks. The results of this reconnaissance, and discussion of their implications (with reassessment of aerial photographic evidence), constitute the new material in the present assessment report.

2. PHYSICAL SETTING

2.1 The Application Site comprises the northeastern portion of Norton Big Wood, an area of 16.72 hectares (see Fig.1). The Site is bounded: to the south by the existing Norton Disney Quarry; to the west by the central and western parts of Norton Big Wood, to the north by the Norton Disney / Thurlby Parish Boundary (although there is actually a metalled road, to be retained, between any proposed development activity (tree screening) and the Parish Boundary), beyond which is a combination of arable land and former gravel workings, and to the east by Butt Lane and Norton Low Wood.

2.2 The surface lies at c.18 m AOD on the western side of the Site, falling gently eastwards and a little southwards. Generally acid soils are present, with an average thickness of 0.33 m; site observation by OAA (see below) shows that there may be up to an additional 0.20 m of organic matter and leaf-mould above the mineral soil surface in most places. A small, easterly-flowing stream crosses the Site just north of centre, with nearby surface levels falling to c.15.5 m AOD towards the east. The stream is characterised as permanent and fast-flowing (in hydraulic continuity with ground water), narrow and shallow; there are some variation in bank-angle and the bed changes between gravel and muddier sediments (especially in backwaters and meanders). However, whilst this stream appears to be a natural feature in origin, its long-distance line is too straight and it is likely that its course has been heavily managed in the past.

2.3 The entire Application Site is under woodland or scrub. Mapping in 1997 (cf. RMC Aggregates (Eastern) Limited, 1999, map between p.13/14) showed the following existing vegetation zones:

Birch Shelter Belt - along northern boundary

Stocked Area (Oak) - across much of the southernmost third of the Site

Lightly Stocked Area (Oak) - southwestern corner

Conifer - as discrete stands, in the northwestern corner, at the east-central boundary, and within the southwest-central part of the Site

Bracken & Scrub with Occasional Standards - across much of the northern two-thirds of the Site

The RMC ecological report indicates that, although the deciduous woodland still appears semi-natural, it has been managed in the past; the mature oaks in the southern sector were planted at regular intervals in the last century and there is also (formerly) coppiced hazel, principally near the stream.

2.4 RMC Aggregates (Eastern) Limited (1999:13) report that "the whole wood lies within the Norton Disney Forestry Scheme, i.e. it is a commercial wood where trees have been grown for timber. The bulk of the remaining commercial timber stands within approximately 2 hectares. Other trees of commercial quality are scattered over the rest of the area." Commercial felling would normally take place over the whole Site in due course but, under the terms of the current Application, only 11.7 ha would be felled, leaving the remainder (including most of the more mature deciduous woodland) intact.

2.5 Average overburden thickness on the Site is given by RMC as 0.77 m (range 0.5-2.6 m) but this interval refers only to the economic characteristics; if one removes clearly stratified fluvial material (defined by there being a top bed of relatively clean sand or gravel), there is a range of thickness in more mixed-texture subsoils (generally silty, gravelly, clayey sands) of only 0.0-0.4 m. Reported colours (browns and oranges) indicate reasonable oxidation, with greying in places probably due to the onset of podzolisation (although no true podzols, with pans, have been reported). No organic accumulations or dark colours appear in the superficial sediments in the RMC borehole logs (6 boreholes and 3 additional water-monitoring points). Standing water in boreholes was measured in the depth range 1.9-3.9 m below the surface (December 1984), dropping from c.16 m AOD on the western side to c.14.7 m AOD in the south-centre; a December level in proximity to the stream dropped to 13 m AOD but, at a monitoring point near the stream on the eastern side of the Site, the November level was 15.12 m AOD and the February level was 14.99 m AOD (also 1984). As a general proposition, the cleaner sands and gravels are considered to be within the normal annual range of the ground water across the Site.

2.6 The economic mineral consists of 'Older River Gravels'; these have been traditionally mapped as the 'Beeston Terrace' but, in fact, they are probably from the fossiliferous Balderton Sand & Gravel formation, which has been reasonably well correlated with Oxygen Isotope Stage 6 (the penultimate glaciation). The RMC borehole logs record essentially granular materials (sand and gravel), although a black to dark grey silt lens, in the interval 6.6-6.9 m below the surface (below 9.7 m AOD), was recorded towards the northeastern corner of the Site. The base of the economic mineral rises towards the west but there is still at least a 4 m thickness of sands and gravels at the western boundary of the Site (i.e. any surviving erosion bench and/or feather-edge of this aggradation lies further west still). The fluvial deposits overlie Jurassic dark blue and grey shales and mudstones (superficially altered to clayey materials) with some thin limestones (mostly Lower Lias Clay).

3. EXISTING SITUATION

3.1 Scheduled Ancient Monuments

3.1.1 There are no Scheduled Ancient Monuments either within, or in the near vicinity of, the Application Site. The nearest SAM (over 1 km distant) is the Roman villa site at Hill Holt Farm, Norton Disney (SK 859 603, Lincolnshire SAM No. 81).

3.2 Listed Buildings

3.2.1 There are no Listed Buildings within or bordering the Application Site.

3.3 Ancient Woodland Designation

3.3.1 The Nature Conservancy Council (now English Nature) Inventory of Ancient Woodland (1989) includes Norton Big Wood, together with Hawdin's Wood to the west. Norton Low Wood and Tonge's Plantation, to the east, are not included. It may be noted that there are no specific 'Ancient Woodland' policies in the relevant Local Plans or in PPG 9; the present task is therefore to supply available information upon the historical dimension, as an addition to the ecological/landscape information supplied by RMC in separate submissions.

3.4 Known Archaeology

3.4.1 The County SMR records no finds or sites of archaeological interest within the Application Site.

susceptibility. However, whilst there were therefore no traces of archaeological 'sites', there was indeed some very useful evidence of landscape history.

3.4.4 The immediate substrate in the survey area was an amorphous gravelly sand or sandy gravel, with no surviving depositional structure. The earliest evidence of Holocene landscape in the area appeared to be traces of ancient soil profiles, always quite strongly truncated by later arable activity (see below). These soils were podzolic in character and, in two augered samples, showed traces of truly 'ashy' eluvial horizons (with magnetic susceptibility close to zero), suggesting a heathland environment.

3.4.5 The next phase of activity consisted of ridge & furrow cultivation. Only minimal traces were observed to survive very close to the eastern edge of the pine plantation, areas deeper into the pines (to the west) and under the birch scrub (to the east) having been disturbed by later activity. The best survival occurred at a point very close to the northern end of the survey line, where approximately 15 m lengths of three contiguous ridges were observed, set at a frequency of c.8 m ('broad rig') on an "east-west" orientation (but see 4.2.5 below), with a surviving surface amplitude of c.1 m. Elsewhere along the plantation margin, there was only patchy survival of low swells on the same orientation and apparently at a similar frequency. No headlands or other indications of plot boundaries were observed.

3.4.6 Augering through the maximum thickness of ridges showed up to 55 cm of homogenised gravelly sandy loam, before the traces of earlier podzolic soils (noted above) were encountered. No micro-artefactual material was noted but the magnetic susceptibility of the ridge material reached 15-22 ($x10^{-5}$) SI volume units, the highest values noted during the survey; it seemed likely that these values represented the signal of the original arable activity which had at least partially survived subsequent acidification and leaching.

3.4.7 The next phase consisted of deciduous woodland, dominantly oak (Collcutt believed he could recognise beech stumps as well, although this genus is not reported in the recent ecological survey of the Application Site), with birch probably representing a spontaneous invader

3.4.2 There has not been, to date, any systematic archaeological fieldwork covering the Application Site. However, work in conjunction with the original Norton Disney Quarry has provided observations up to and all along the southern margins of the proposed extension and also in a strip between the Quarry and the stream, now within the southwestern margin of the extension (Application Site).

3.4.2 In 1993-94, an area of 33.3 ha to the west of Butt Lane and to the south of Norton Big Wood (the present Norton Disney Quarry), was subject to an archaeological desk-top assessment (Johnson 1993) and a geophysical survey (Johnson 1994). The desk-top assessment clarified details of post-Medieval agricultural landuse, but did not point to any potential archaeological constraint, save for a small number of dubious cropmarks. The topsoil magnetic susceptibility survey detected two primary areas of magnetic enhancement of modern origin, and gradiometry and hand-augering showed that buried and microtopographic features (some of which had shown as cropmarks) were referable to the strong fluvial structures in the underlying sand and gravel; the report concluded that there were no indications of the presence of any significant archaeological accumulations (Johnson 1994:19). The County SMR shows no observation, by the County Archaeological Officer or any other observer, of archaeological material during quarry works on this site.

3.4.3 In conjunction with Norton Disney Quarry, a recharge trench within a strip cleared of woodland was designed to pass northwards to connect with the stream running through the current Application Site (see Fig.1). The trench corridor (approximately along Easting 880 and between Northings 602 and 605), which ran through the woodland that was within the southwestern part of what is the current Application Site, was subject to prior survey (Collcutt 1994), involving observation of both the 10 m wide tree-felling corridor and the proximal woodland (principally a strip of pine plantation some 30 m wide to the west of the corridor, since there was an existing trackway and disturbed birch scrub immediately to the east). No discrete earthworks (e.g. mounds, pits, ditches or major banks) or surface artefacts of any plausible antiquity were recorded within the survey area, nor were there any foci of burnt material or raised magnetic

wherever/whenever clearings occurred. The stumps of mature trees were present in the areas of surviving ridge & furrow within the pine plantation. Further east, beyond the zone of birch scrub, the mature deciduous woodland survived intact. Under this intact woodland, susceptibility levels at the organic/mineral; contact reached 10-15 SI units, lower than the levels noted for the ridge material (see above) for the preceding arable phase.

3.4.8 The next phase consisted of ploughing (single deep-cut 'narrow rig' with a frequency of c.2 m) in preparation for regular coniferous plantation within the western half of the survey area. The orientation was southwest-northeast, and this ploughing usually destroyed the earlier 'broad rig' and, presumably, removed deciduous tree stumps. Pines were then planted in lines approximately along ridge crests. From the size of the pines, this plantation did not appear to be particularly old (perhaps less than 40 years), although no documentary or verbal evidence was available on this point. The magnetic susceptibility profile within the plantation (in areas where the 'broad rig' had been destroyed) showed a peak of 4-6 SI units at the organic/mineral transition, falling to only 2-3 units in the subsoil.

3.5 Cartographic & Historical Information

3.5.1 The 1st. Editions 1-inch OS map and Bryant's 1-inch county map of 1828 are the first to show Norton Big Wood, which is labelled 'Norton Wood', but Norton Low Wood to the east is not shown as widely wooded. The OS map is of considerable interest, since there is an unusual combination of formal symbols in that part of 'Norton Wood' north of the stream; this area shows (deciduous?) trees in clumps but there is also a clear underlying (or overprinted) moorland symbol (slightly wavy parallel lines), which has been deliberately drawn within the woodland plot (the symbol set is at a different orientation from that shown immediately to the north in 'Thurlby Moor'). Other documentary sources confirm that there were still extensive tracts of moorland to the north of the Application Site (in Thurlby Parish) well into the 18th. and 19th. centuries but this 'double-symbol' approach on the OS map suggests that at least parts of Norton Big Wood may have been open moorland within living memory as of 1824.

3.5.2 The 1st. Edition OS larger scale sheets published in 1887 (25-inch and 6-inch scales, surveyed in 1886) provide the earliest large scale maps showing the Application Site.

3.5.3 The parishes of Norton Disney and Thurlby are the product of settlement nucleation in the Anglo-Scandinavian period (9th.-11th. centuries AD). The parish boundaries of such nucleated settlements were usually drawn in areas which were essentially marginal to the community, perhaps in an area of shared resources with neighbouring parishes such as woodland, moorland or common grazing. Consequently, it is unlikely that the Application Site, which is bordered to the north by the Norton Disney - Thurlby parish boundary, would have proved a favourable location for Medieval settlement.

3.5.4 The parish boundary itself may merit some further attention. Although generally straight at the point where it borders the Application Site, suggesting an arbitrary division of moorland between Norton Disney and Thurlby, it connects further to the west with the noticeably more sinuous Norton Disney - Swinderby boundary. The boundary between Norton Disney and Swinderby for 150 m at the western extremity of the parish follows a possible Roman or pre-Roman boundary ditch marked by a plough lynchet. It is possible that the Norton Disney - Thurlby boundary on the border (just north) of the Application Site may follow, or have been marked by, an ancient or Medieval feature such as a bank or ditch. This may have been ploughed out by arable activity, or during the construction of the present wide trackway; whether buried archaeological traces might still survive is unknown, and probably less likely than in other stretches of this boundary line where there is no modern track.

4. SITE RECONNAISSANCE

4.1 Methodology & Site Conditions

4.1.1 A reconnaissance of the Site was conducted in early October by Collcutt. North-south (magnetic, Magnetic North estimated from OS data to be c.5° west of Grid North) main traverses were set at 100 m intervals across the whole Site, with (tape) measured control at the woodland boundaries and compass guidance along lines; a total main traverse length of 1.84 km was thus established. These lines were walked (although the term 'waded' is probably more apposite, given the undergrowth) as accurately as possible, although some diversions were necessary to circumvent impenetrable obstacles. At reasonable intervals, 'excursions' of c.50 m were made to one or both sides on an east-west alignment, return to the main traverses being ensured by the placing of an easily visible marker; it is estimated that these 'excursions' brought the total traverse length up to some 4 km within the 16.72 ha of the Site.

4.1.2 Ground conditions for visibility were generally poor to very poor. The only wider exception was within pine plantation, where, due to the dense planting and consequent lack of undergrowth and to the fact that no branch trimming had taken place, the entire surface could easily be seen between rows for a distance of c.75 m from any vantage point. Over the rest of the site, ground cover usually comprised more or less continuous bracken, 'reinforced' by a moderately dense network of briar; in open zones, the bracken reached as high as 1.5 m with briar runners climbing to c.1.2 m, although this cover dropped to within the range 0.5-1.0 m thickness under denser tree canopy (lowest under oak, moderate under birch). A few zones of hazel had only c.0.25 m cover of briar. Therefore, as a general proposition, it was necessary to rely much more upon 'feel' than upon sight to record variations in microtopography. In passing, it may be noted that, given the intimate association of bracken and briar, it seems most unlikely that conditions would improve, even in the late winter season; the dead and dormant vegetation would settle a little but probably not enough greatly to enhance visibility, and the resulting 'mat' would probably be even more difficult to wade through. Finally, there were some zones (especially towards the northeastern

and eastern parts of the Site) in which extremely well established (probably over a century old) and intertwined rhododendron occurred, either in single clumps or as bands; these zones were completely impenetrable but, because they were rarely very wide in their narrowest dimension, it was possible to see enough of the ground in most cases to suggest that it is unlikely that the rhododendron is hiding significant earthworks, additional to those reported below.

4.1.3 It will be appreciated that precise location of points under these conditions was extremely difficult. Use was made of previously mapped boundaries, tracks, buildings, stream, traces of boreholes, water-monitoring points, and the boundaries of ecological zones, together with tape and compass. Fortunately, no point phenomena were discovered which would have required better than 25 m precision (about the worst level achievable in the event).

4.2 Field Observations

4.2.1 The margins of the Site are of disparate types. On the west, the boundary is intermittently marked by post-and-wire fence, following no extant landscape/ground feature and even cutting arbitrarily through planting plots. There is a continuous barbed-wire fence along the northern boundary, with no feature (bank or ditch) before the road. Along the eastern boundary, there is a ditch flanking the Butt Lane, with an intermittent low inner bank, coupled with particularly persistent stands of rhododendron. Along the southern boundary of the Site, there is a reasonably continuous bank, where well preserved c.3 m wide and 1.2 m high but rather degraded in the central section; on the outer (southern) side, there is a ditch, a metre or more deep in the western half but now gravel-filled (with a recharge pipe, to produce a 'French Drain') in the eastern half. This southern bank and ditch would appear to be a more formal feature, established (probably early in the nineteenth century) to mark the limit between woodland and arable land.

4.2.2 Referring to the RMC ecological zones (see Fig.1), the Birch Shelter Belt along the northern margin, the Bracken & Scrub north of the stream, and the (very) Lightly Stocked Area in the

southwest, contain no coherent earthworks of any plausible antiquity. The surface of these areas is either rather flat or irregular and hummocky (suggesting past de-stumping). Segments of shallow linear (somewhat sinuous) scars, sometimes with Y-junctions, were noted at several points within the Bracken & Scrub; these are certainly the traces of the dense and shifting network of tracks (bright lines) seen to cross this area on aerial photographs over the last six decades (see below).

4.2.3 A group of three buildings is mapped in the northeastern part of the Site, close to the stream; all these buildings are extant, although in a severely derelict condition. They have wooden planking walls, with wide sets of glazed upper windows. The largest building has a corrugated metal roof, whilst the other two have planking. All the main (structural) timbers are mechanically sawn and have a simple jointing system, often reinforced by metal bolts. Flooring is provided by modern brick, with a number of linear bricked 'trenches' cut at least 1 m below floor level. There are traces of machinery housings and a number of wooden work benches. There is a solid bridge (apparently of brick and concrete) across the stream, linking the grouping. These buildings are clearly of comparatively recent origin (probably early 20th. century); it is assumed that this grouping was a sawmill.

4.2.4 There is considerable disturbance all around the group of buildings, marked by cover of ground-elder, nettles and other weeds, and by zones of hummocky ground. There seems to have been some superficial 'grub-quarrying' on the western and northwestern sides, and there is one clear (unmetalled and overgrown) trackway leading from the northern boundary road near the northeastern corner, on a bearing of 210° (magnetic), to one such area of disturbance. To the southeast of the buildings another (active) trackway curves round to join the eastern boundary (Butt Lane), just south of the stream crossing; this track has been used as an access to permit recent tipping of soils and subsoils, in small-scale events but over a relatively wide area.

4.2.5 The RMC ecological study recognised Conifer plantation as discrete stands, at the east-central boundary, in the northwestern corner, and within the southwest-central part of the Site. However, the present observations would suggest that the latter two zones should be linked as a

more or less continuous band of former plantation on the eastern side of the Site, although (especially north of the stream) the pines have given way to birch scrub or mixed pine/birch in some areas. Narrow forestry 'rig' under the pines was noted during earlier work (see 3.4.8 above), although even this does not survive very well over wider areas and much of the ground is more or less flat. In the northwestern corner of the Site, an old (no longer functional) ditch (without an appreciable raised bank) starts at the northern road margin, some 80 m east of the corner, along a bearing of 310° (magnetic), first curving gently to 300° and then 290°, before curving more sharply to 200° close to the western boundary of the Site. This feature is remarkable only in as much as it was the only drainage ditch discovered within the whole Site. The small area of 'broad rig', noted during earlier work (see 4.3.5 above) as surviving within a corner of pine plantation just south of the stream, was revisited; it is of significance (see below) that the measured strike (magnetic) is 240°-060° (with c.8 m frequency).

4.2.6 That part of the Site remaining to be described lies south of the stream and east of the western band of pine, constituting just less than half of the Application area. No features were recognised in the northeastern corner of this block, nor in the easternmost strip and southeastern corner, all zones in which the surface is either flat or a little irregular. Similarly, there is a band, some 40 m wide (north-south) all along the southern margin of the block (perceptible until the southwestern Lightly Stocked Area is reached), in which there are no earthworks; this band is nevertheless noteworthy, as it does contain relative mature oak trees.

4.2.7 This leaves a 'core' area, which, for reasons that will become apparent and for ease of reference, will be labelled the Ridged Area (see Fig.1). Moving southwards, the zone between the stream and the first mapped east-west track (extant and easily located) has quite dense vegetation, with low birch and hazel; south of this track, there is an almost 'open' bracken zone, with a few birch trees; the zone from the northern edge of the RMC mapped Stocked Area to the next mapped east-west track (very overgrown and rather difficult to follow) appears to be dominated by tall mature birch, with rhododendron clumps becoming increasingly common eastwards; only south of this lower track does mature oak become the dominant species. In all of these ecological

zones (the zonation implying different details of landuse history), there are traces of a ridge & furrow system, as described below.

4.2.8 The ridge & furrow comprises one continuous system across the whole Ridged Area, with no surviving trace of boundary features on any side and no internal headlands or changes of geometry. Ridges lie 6.5 m apart (variation of no more than ±0.25 cm in 30 measurements made at various points across the Ridged Area), and their strike (magnetic) is 272°-092° (variation of no more than ±2° in 30 measurements made at various points across the Ridged Area, not including even the slightest systematic 'curvature' or 'fanning'). Survival is never 'perfect' (i.e. with the smooth/healed form expected under pasture, for instance), much of the system being disturbed (quite severely in a some cases) by burrows and de-stumping/tree-throw depressions; it should be noted that, in the southern oakland, trees have been preferentially planted close to the ridge-crests, even though the actual planting lines appear to be more closely parallel to the southern margin of the Wood. Zones of better survival may show an amplitude (between ridge-top and furrow-base) of 40-50 cm (possibly with as much as 20 cm extra amplitude masked by the preferential accumulation of organic detritus in furrows), although only 20-30 cm amplitude is common over much of the Area. At the margins, the ridge & furrow relief simply fades until it can no longer be identified. The ecological zonation crossing the Ridged Area was noted above; the only perceptible effect of this zonation (which must itself post-date the ridge & furrow) is that there is a vague tendency for the earthworks to be more poorly preserved in the mature birch/rhododendron zone than in the other zones.

4.3 Reliability

4.3.1 Given the generally dense ground cover, it is not possible to assert that an isolated, relatively small and low earthwork 'site' would have been found during the recent reconnaissance. However, the apparent persistence of surface type (ridge & furrow, conifer planting lines, flat or hummocky terrain) within given zones lends some indirect support to the proposition that there is a low risk of significant ancient earthwork 'sites' having gone unrecorded. In this connection,

it should be noted that, because ancient earthworks (such as barrows) may sometimes have guided later landscape geometry or may have been set aside from later landuse, care was taken during the reconnaissance to examine areas immediately around more temporally stable track/boundary junctions (or marked change of line) and to investigate unusual clumps of mature vegetation (and even isolated mature trees/rhododendrons within scrubland); none of these 'preferred' locations provided evidence of ancient earthwork 'sites'.

4.3.2 With respect to the Ridged Area, the extreme consistency in geometry suggests that no internal feature (division) is likely to have been missed. However, despite efforts to observe the periphery of this Area at many points, it is possible that some localised survival of a bounding feature could have remained hidden (cf. 5.3 below).

5. AERIAL PHOTOGRAPHIC DATA

5.1 Aerial photographs of Norton Big Wood had been examined by OAA on the occasion of earlier assessments of neighbouring open land. A sharp and regular linear set had indeed been noted within the scrub and clearings but it was dismissed, without mention, as likely to comprise recent drainage features. In the light of the field observations, noted above, this was clearly an error. Accordingly, OAA (Dr. A.P. Johnson) have returned to Swindon to re-examine the NLAP coverage of Norton Big Wood, and of Hawdin's Wood immediately to the west and Norton Low Wood immediately to the east (Grid Kilometres SK 67/60 and 88/60).

5.2 Despite the very careful and 'forewarned' re-examination, no additional blocks of parallel marking sets of any type were discovered within any of the local woodlands, save for a small plot of 'classic' ridge & furrow north of White Hall (centred at SK 8750 6015). In addition to major and contiguous blocks in the river floodplain to the east, the nearest survivals (in the 1940s) of small areas of 'classic' ridge & furrow were noted outside the woodland boundaries centred at:

Church Farm, Thurlby - SK 8980 6050

Tonge's Farm, Norton Disney - SK 8915 5955

North side of Norton Disney village - SK 8905 5928

West of White Hall, Norton Disney - SK 8730 6000

West of White Hall, Norton Disney - SK 8750 6015

5.3 Within the Application Site, the northern part of the Ridged Area (apparently under low scrub) is clearly perceptible on photographs of the 1940s (an enlargement of the best example is reproduced here as Fig.2). The very continuous and rectilinear nature of the ridges is obvious, covering a slightly larger zone than that in which the form proved perceptible on the ground during the recent reconnaissance (cf. Fig.1). There are no internal divisions and there are still no clear boundaries. The apparent termination of the ridges (with no obvious bank or ditch) along a roughly north-south line south of the northwestern corner of the Ridged Area may be real, but

the occurrence of paths in proximity and the suspicion of a shadow effect from a line of trees just to the west make such a geometry uncertain.

6. DISCUSSION & CONCLUSIONS

6.1 General Archaeological Potential

6.1.1 Archaeological work on the present Norton Disney Quarry site (Johnson 1993 and Johnson 1994) suggests that this immediate area does not have significant archaeological potential. The recent reconnaissance failed to identify any discrete earthworks which might have dated from a prehistoric period, prior to the known heathland phase.

6.2 Designated Historic Features

6.2.1 Since much of the deciduous woodland within the Application Site is to be retained (other cover types being the result of relatively recent felling/planting activities), there would appear to be no *prima facie* risk to the objective of the Ancient Woodland designation. Indeed, the information currently available would suggest that even the deciduous (planted/managed) woodland is a relatively recent feature (post-dating heathland and arable cultivation), and that the 'Ancient Woodland' designation reflects a 'short' timescale more relevant to modern ecology than to archaeology or ancient history.

6.2.2 It may also be noted here that any surviving hedgerow along the Parish Boundary would be a Historic Hedgerow (simply on statutory criteria concerning historical mapping); if such a hedgerow does indeed survive (the area north of the metalled road was not included in the recent reconnaissance), it would be safe in any case, beyond the northern limit of the proposed development activities.

6.3 The Ridged Area

6.3.1 The main characteristics of the Ridged Area, derived from both ground reconnaissance and aerial photographic evidence, are straightness of ridges and extreme regularity in overall pattern, low amplitude and high frequency, all within a land plot (without internal divisions or clear outer boundaries) with minimum dimensions of 330 x 200 m.

6.3.2 These characteristics are markedly different from those of the 'classic' Medieval ridge & furrow 'furlongs' seen on aerial photographs in the general vicinity. The traces of ridge & furrow, accurately surveyed by Oxford Archaeotechnics in 1993 within Stapleford Wood (now a conifer plantation), some 5 km south of Norton Big Wood, appear to be reasonably typical of the 'classic' type. These traces lie well beyond the maximum extent of arable land shown on an Estate map of the 1680s and are reasonably interpreted as forms dating from the 13th.-14th. centuries, subsequently abandoned to revert back to moorland. One 180 x 85 m block (centred at SK 5755 5316) comprises 7-8 m frequency ridges running (rather sinuously) approximately east-west and appears to be a whole field unit, with 15-20 m wide headlands at each end approached by perceptible curves in the ridge crests; traces of a second (earlier) ridge & furrow layout are visible, running diagonally across the southwestern corner of the extant block. Another 150 x 50 m block (centred at SK 6469 5571), with no clear boundaries, again has slightly sinuous and (in the overall set plan) curved and slightly 'fanned' ridges, running NNE-SSW, at a frequency of c. 10 m.

6.3.3 In the literature on ridge & furrow reviewed by OAA (M.R. Petchey), there is a general acceptance (cf. Taylor 1978, Rackham 1986) that there exists a form that is different from and (it is usually argued) later than the easily recognisable Medieval forms. It is characterised as **straight**, in contrast to the typical Medieval S-shape; **long** (longer, that is, than the usual Medieval furlong, a variable measure but not usually longer than 220 yds or 200 m); and, in its physical formation, **weak and inconspicuous**. It is often seen to occur on marginal land, and has commonly been dated to the late 18th. and early 19th. centuries, when such marginal land

was brought into cultivation as a result of degenerating relations with France (fear of blockade), culminating in the Napoleonic Wars.

6.3.4 However, Taylor (1976:111) notes that some Medieval S-strips can be seen in the field to have been replaced by straight strips before the end of the Middle Ages, a change he attributes to a change in draught animal from oxen (large teams) to horses (small teams or single animal). Similarly, some proven 17th and 18th. century fields can be seen to contain straight ridge & furrow (Taylor 1978:126). It appears that any newly constructed late or post-Medieval ridge & furrow was likely to be of the 'straight' type, although many 'classic' S-type forms certainly continued in use long after the Medieval, with little or no modification.

6.3.5 It would therefore seem reasonable to suggest, on the evidence of its ridge & furrow form alone, that the Ridged Area at Norton Big Wood should date from between 1500 and 1815 (woodland having been established by the 1820s), possibly with greater likelihood towards the later 'francophobe' end of this interval. This would match the suspicion that the northern part of the Wood had been moorland within living memory in 1824.

6.4 Vegetational Evolution

6.4.1 The County Screening Opinion (see 1.2 above) noted that earthworks within the various woods in this vicinity contain "information on the vegetational development and plant colonisation in an area of contrasting soils where fluvio-glacial deposits are spread within a clay vale". If intended to apply at a detailed level, this statement would appear to refer to historical ecology (reconstruction from the current biota), not to archaeology, since any surviving earthworks are most unlikely to preserve anything even approximating to a continuous palaeoenvironmental record. There is a much higher potential for such survival within appropriate features on the claylands to the east.

6.4.2 The survey of the planned trench corridor (Collcutt 1994) clearly demonstrated the range of information available on changes in the historical and cultural landscape of the sand & gravel zone, changes which, in any case, are obvious or strongly implied in the historical and cartographic documentation. One would not expect truncated podzols or various types of tilth to preserve any particularly useful details on vegetational development and plant colonisation.

6.5 Recommendations

6.5.1 The County noted that "the area of proposed extraction contains probably the best of the ridge and furrow systems" within Norton Big Wood and its neighbouring woodland, although there are no details, or even mention, in the SMR. OAA are not able to view the ridge & furrow on the ground in the surrounding private woodland, and therefore cannot assess the comparative argument (or, indeed, the possibility of diversity of form/date). However, the County's observation is indeed a reminder that the Application Site is only a relatively small part of the extensive tract of woodland still surviving, especially westwards ('Ancient Woodland').

6.5.2 The recent reconnaissance and re-examination of the aerial photographic evidence have shown that the simple label 'ridge & furrow' is not sufficiently precise to characterise the phenomenon in the Ridged Area of the Application Site. There is every reason to suggest that these remains are the result of a late and short-lived arable phase, possibly immediately prior to woodland plantation (which had occurred by the 1820s), but almost certainly not prior to AD 1500. Unlike 'classic' Medieval ridge & furrow, which may have persisted and evolved over several (many) centuries, the Ridged Area is thoroughly uniform and is best interpreted as a simple 'event'. It contains no features of interest to changes in landholding, or to the evolution of agricultural methods or landuse/vegetation patterns. Once the comparatively recent 'event' has been recorded, there is very little else of merit, from the perspective of either academic enquiry or of public heritage.

6.5.3 This having been said, it is entirely practical and reasonable to expect the proposed development to include mitigation elements, from both the perspectives noted above, which would not be onerous when weighed against the strictly local interest of the surviving remains.

6.5.4 Prior to clearance for development, it might be possible to recover a little further academic information on past arable phases. It has been noted that part of the apparent western margin of the Ridged Area may have been located on aerial photographs but has not been recognised as a clear surface form in the field; trenching across this line might show the nature of any original bounding feature. Since the soils are relatively light, a significant sample of ridge material (former tilth) or other clearly associated deposit could be coarse-riddled on site, in the hope of retrieving artefactual evidence of date, although it should be noted that contemporary artefacts are not likely to be common, given a late and short-duration event. What might be of greater interest would be comparison, using the same approach, with the very small patch of different (orientation and frequency) ridge & furrow, surviving under pine plantation on the west-central side of the Application Site. The greater the difference in age between these two sets of features, the greater the chance of retrieval of useful information through the comparative approach; if the western patch is the older (as currently suspected), it may be easier to retrieve artefacts resulting from manuring, due to longer duration of use and to the increased proximity of middens to 'domestic' activities as one passes back in time. The opportunity could also be taken (a) for a soil scientist to check the significance of any pedological phenomena exposed in the trenching, and (b) for an palaeo-environmentalist to examine (probably by augering, at least in the first instance) the sediments in proximity to the (managed) stream, in the hope of discovering more coherent depositional sequences of relevance to landscape history.

6.5.5 From the point of view of preservation of the public heritage, it should be noted that a significant sample of the earthworks in the Ridged Area (a sample which contains all the visual interest of the uniform whole) will be retained undisturbed within the wide woodland border on the southeastern side of the Application Site. The permissive path, proposed around the restored lake margin, will pass immediately alongside this retained ridge & furrow, crossing the trend

obliquely for a distance of at least 150 m within the zone of better preserved earthworks; if judged appropriate, presentation could be enhanced by means of an information board.

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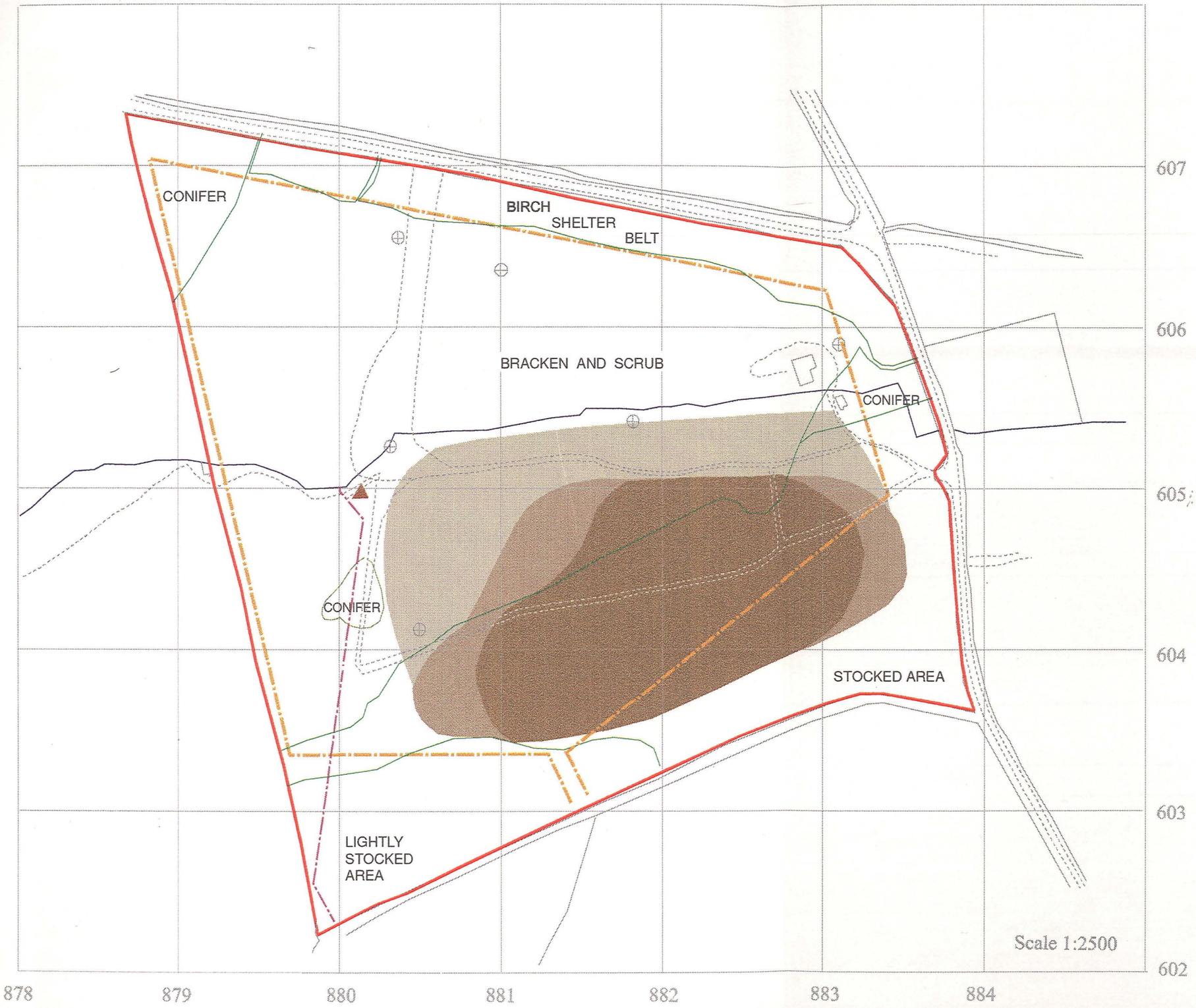

KEY

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- EXTRACTION AREA
- ECOLOGICAL ZONES
- LINE OF PERMITTED RECHARGE TRENCH
- BOREHOLE LOCATIONS

RIDGED AREA

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Figure 1

Figure 2