

2. BACKGROUND

2.1 RIBBLE TOPOGRAPHY – COUNTRYSIDE CHARACTER AREAS

- 2.1.1 The former Countryside Agency (now Natural England) has divided England into 159 'Joint Character Areas' which represent zones of distinctively similar landscape character. Each area has a report which outlines the influences that determine the character of the landscape. The Ribble Valley catchment takes in six of these character areas (Fig 3) (Countryside Commission 1998).
- 2.1.2 ***The Bowland Fells***: this is a large-scale sweeping landform, cut by narrow wooded valleys and discrete cloughs that drain the moorland heights, creating a mosaic of woodland, unimproved meadows, pasture, marshes and streams. There are expanses of heather moorland and blanket bog with areas of reclaimed moorland pasture, enclosed by drystone walls at their edges. The exposed moorland tops are connected to the fertile river valleys by steeply sloping escarpments. Settlements are scattered villages and isolated farms, construction in stone dominating the building style.
- 2.1.3 ***Bowland Fringe and Pendle Hill***: this is a generally undulating landscape with local river valleys creating variations in topography, along with upland features including Longridge Fell, Beacon Fell and Pendle Hill. Limestone outcrops are common features of the Ribble and Hodder Valleys. Meandering rivers, commonly lined by trees, and dotted with oxbow lakes, are prominent in a predominantly pastoral landscape.
- 2.1.4 The land has undergone much in the way of improvement for dairy and livestock farming. Most grazing occurs in the lush fields of the river valley bottoms, with some grazing at higher altitudes. River bodies include the Calder, Ribble, Hodder, and the Wyre. There is semi-natural woodland, much of which is Designated Ancient Woodland, on the valley bottoms and ridges. The main settlement pattern is one of small villages, hamlets and scattered farmsteads interconnected by winding country lanes, often hedge-lined.
- 2.1.5 ***Lancashire and Amounderness Plains***: this is a relatively flat area of gently rolling lowlands punctuated by occasional isolated hills. It is a large-scale agricultural landscape with a patchwork of pasture and arable fields with areas of woodland. It includes areas of reclaimed land, many of the fields have ponds, and drains and dykes are characteristic of the lands to the west, where there are also remnants of lowland mires and mosses. The river estuary heads are often areas of salt marsh. The pattern of lanes and tracks is more regular, taking on a rectilinear pattern, and there is a much lower occurrence of hedgeline or fencing along these transport routes in comparison with Bowland. The buildings are predominantly isolated brick farmsteads in the rural areas, with major settlements along the coasts, often comprising former Victorian seaside resorts.
- 2.1.6 ***Lancashire Valleys***: the broad valley of the River Calder and its tributaries runs north-east/south-west between the backdrop of Pendle Hill and the southern Pennines. The southern part of the area has an intensely urban character due to the post-industrial expansion of the towns of Blackburn, Burnley and Accrington. The industrial heritage of the area is strongly represented in the

architectural styles, the main industries being cotton weaving and textiles. Many mill buildings, ponds and lodges remain as a legacy of the industrial heritage. The industry required enhanced transport routes and the area contains the Leeds-Liverpool Canal, the Preston to Colne rail link and the M65 motorway, spanning the steady and changing need from the late eighteenth century to the present day. Further north, Victorian stone buildings sit in the landscape, along with large country houses, often with associated parks. The agricultural land has been subject to a degree of fragmentation as a result of industrial development and associated urban expansion in the area. The field boundaries are markedly more regular to the west than the east and woodland is mainly limited to cloughs on the valley sides.

- 2.1.7 **South Pennines:** this is a large-scale sweeping landform with an open character created by exposed gritstone moors at an altitude of 400-50m, deeply trenched by narrow valleys and wooded cloughs, with mixed moorland and blanket bog, and enclosed pasture at lower elevations enclosed by drystone walls. There are valuable wildlife habitats on the open moorland and moorland fringe, including semi-natural boggy mires, acid flashes and wooded cloughs, and many reservoirs throughout the area. Settlement is concentrated along the valley bottoms, with stone being favoured over brick; less dense settlement extends along the valley sides. The area has seen incongruous developments, such as windfarms, transmission masts, and overhead power lines, as well as extraction industries exploiting sandstone, gritstone and clay quarries around the fringes of the area.
- 2.1.8 **Yorkshire Dales:** this is a large-scale upland landscape of high, exposed moorland dissected by deep dales. The area contrasts with the wild open moor and the sheltered dales, each with a character of its own. Agricultural usage is limited, given the high altitude and the relatively poor climate. The south and west parts are formed of limestone, with cave systems, outcrops, gills, gorges and pavements. The moors are heather or extensive blanket bogs on plateaux, with rough grazing on the upper slopes. The dale sides have more permanent pasture, and hayfields are present in the dale bottoms in the most fertile areas. Woodland is limited and mainly confined to villages and farmsteads, clumping around stream sides and steep slopes. Ancient Woodland tends to be located on steep gill and dale sides.
- 2.1.9 *The River Ribble Catchment Flood Management Plan* (Environment Agency 2006) was consulted, as were the *Water Framework Directive* (European Commission 2007) and the *Ribble Pilot Characterisation Report* (Environment Agency 2005). Again, a broad historic pattern of land use could be determined, as well as current information regarding the natural environment and legislation. The HLC was used to provide a spatial framework for the GIS analysis (*Section 6.4*) and to incorporate the enhanced documentary information contained within a gazetteer.

2.2 THE GEOLOGY OF THE RIBBLE BASIN

- 2.2.1 **The Basin:** the drainage basin or catchment of the River Ribble covers some 1320km² and comprises four major headwater tributaries: the Upper Ribble (439km²); the Hodder (255km²); the Calder (32 km²); and the Darwen (130km²)

(Fig 2). The Upper Ribble rises in the north Pennines, in the Yorkshire Dales National Park, creating a watershed between the Ribble, Aire, Wharfe, Ure and Dent, with a maximum elevation of 692m. The Hodder flows south out of the Forest of Bowland Area of Outstanding Natural Beauty (AONB), rising on the Bowland Fells and has a maximum elevation of 542m. The Calder rises in the west Pennines moors in the former industrial regions around Burnley, from a high point of 556m. The Darwen rises in the lower reaches of the west Pennines moors around Blackburn and has a maximum elevation of 402m. The Ribble flows into the Irish Sea c15km downstream from Preston, with a narrow flute-shaped estuary confined to the north by the rise up the Kirkham end moraine (Gresswell 1967a) and to the south by the low-level raised ground that forms the northern edge of the Late-Glacial and Holocene lacustrine basin of Martin Mere (Middleton *et al* forthcoming). The Ribble is tidal upstream as far as Preston, and in the past has sustained docks that required regular maintenance to allow the passage of ships, but since the decline of the docks and the cessation of dredging sand banks have formed at the mouth of the Ribble. The Hodder, Calder and Upper Ribble tributaries join some 35km from the coast at a marked reduction in gradient of the fluvial system, and enter a meandering reach that extends to the coast at a relatively low gradient falling 1m per km over the 35km.

2.2.2 Geology: the majority of the Ribble basin is underlain by Carboniferous strata deposited in a large basin during Carboniferous times, 290–354 million years ago (Fig 4). The oldest rocks that crop out in the Ribble basin are Silurian and Ordovician siltstone and mudstones in the Upper Ribble Valley around Settle. During the Carboniferous period a major rise in sea level produced marine conditions that covered almost all of England and Wales, encouraging the deposition of limestone during the Dinantian. During the late Carboniferous period a combination of a fall in sea level and basin infill produced a thick sequence of sandstones, the Millstone Grit Namurian strata which underlies the Bowland Fells and Pendle Hill. To the south of the study area, the Westphalian strata reflect the dense forests that grew on these Upper Carboniferous low-lying deltas forming the Coal Measures (BGS 1991). Towards the end of the Carboniferous period, the major phase of mountain building, called the Variscan Orogeny, folded and deformed these strata, producing the Pendle and Pennines monocline. In Permian times, desert conditions prevailed, with Britain lying near the Equator, and sandstones were formed from desert sand dunes. The Permo-Triassic subsidence produced a large basin that extended across lowland Cheshire and the Irish Sea, within which was a large semi-arid river system that deposited thick sequences of fluvial and aeolian sandstones. During the late Triassic period, rising water levels encouraged the deposition of extensive mudstones (*ibid*).

2.2.3 Geomorphology: in the Lower Ribble Valley, the solid geology is buried beneath thick sequences of Pleistocene deposits, mostly laid down during the last glaciation, the Devensian glaciation of Great Britain, at 75,000 to 11,500 years ago (Johnson 1985). The Ribble basin has attracted little recent attention from researchers with interests in Pleistocene history, compared to the surrounding regions of the Lake District, the Cheshire Plain and the adjacent Pennine uplands (Rose and Letzer 1977; Johnson 1985; Mitchell 1991; Glasser and Huddart 2002; Worsley 2005). The dominant land-forming processes of the

last 2.5 million years have been of glacial origin. The region has probably been glaciated on several occasions during these years, with the bulk of the uninterrupted evidence for this from the isotope stratigraphy in marine sediment (Shackleton *et al* 1995). However, much of the evidence for the previous glaciation in the North West has been removed by the ice advances of the Devensian glaciation.

- 2.2.4 The ice that advanced to cover north-west England originated in centres in Scotland, the Lake District and the northern Pennines, and moved southwards through the Cheshire and Shropshire lowlands, reaching maximum limits near Wolverhampton. Much of the research undertaken on the glaciations of Lancashire date to late nineteenth century, when Binney (1852) and De Rance (1877a) described the coastal exposures near Blackpool. Further research accompanied the various maps and memoirs of the British Geological Survey (BGS) (Wilson and Evans 1990; Aitkenhead *et al* 1992). The most substantial geomorphic feature on the lowland plain of Lancashire is the Kirkham end moraine complex (Gresswell 1967a), which formed an arc of low former ice-marginal hills between Preston and the coast at Blackpool. Much of our understanding of the glaciation of Lancashire still relies on the work of Binney (1852) and De Rance (1877b); however, parts of the region have benefited from more recent evaluation (Crofts 2005). The area, however, is a potentially fertile region for renewed research, particularly given current views on the dynamic nature of ice stream behaviour throughout the Devensian (eg Bowen *et al* 2002) and during the retreat from the last glacial maximum (eg Thomas and Chiverrell forthcoming).
- 2.2.5 The rockhead or top of the solid geology in the Ribble Valley is some 20-25m below Ordnance Datum (OD), buried by a sediment fill that is in places over 50-60m in thickness. The major rivers of the Lancashire sector of north-west England, the Mersey, Ribble, Wyre and Lune, have undergone a similar sequence of late Pleistocene and Holocene development (Harvey 1985; 1997). They were heavily affected by glacial activity regularly during the Pleistocene, and their lower reaches are incised into the deposits of the last glaciation, the Devensian, and the upland upper reaches were also sculpted by ice (Johnson 1985). Borehole evidence shows that the rivers followed valley systems that existed before glaciation, but there is also evidence for glacially-induced drainage alteration and for the presence of buried palaeo-valleys shown in variations in the depth of the rockhead. Throughout the Post-Glacial period the fluvial system has responded to a multiplicity of external drivers and internal controls, with land use and climate, in particular, held to be important factors controlling the evolution of the river systems. Initially, during the Post-Glacial period, cold-stage processes led to the remobilisation of glacial deposits down-slope through solifluction slope processes and the snow-melt pulsed rivers were choked with sediment with aggrading braided or single-thread gravel-bedded channels. With vegetation and soil development, the landscape would have stabilised, reducing sediment availability encouraging incision and a single channel form. However, Lancashire experienced fairly major variations in base-level during the early Holocene, owing to sea-level change driven by a combination of eustatic and glacioisostatic factors, which would have been a fairly significant driver of the fluvial regime during late glacial and Holocene times (Johnson 1985) (Fig 5).

- 2.2.6 Through the Holocene, the climate has affected rivers over varying time-scales, ranging from switches in long-term hydroclimate (wet and dry) to the incidence of high-magnitude rainfall events inducing floods on much shorter timescales (Chiverrell *et al* 2006). From the Neolithic period onwards, evidence for human presence gradually increases in visibility in both archaeological and palaeoecological records, with more long-lived and/or substantial woodland clearances during Bronze Age, and particularly from the late Iron Age onwards. These changes have been linked directly with hillslope gullying in the uplands (Harvey and Renwick 1987; Chiverrell *et al* 2006), and mooted as a significant driver of increased sediment supply to lowland river systems (Harvey 1997; Chiverrell *et al* 2006). The sediment transmission behaviour of the fluvial system is also very important, moderating the response to external drivers like climatic changes and anthropogenic impacts, and their influence on and propagation through local-scale cycles of erosion, sediment supply, storage and remobilisation between the headwaters and the coast (*ibid*).
- 2.2.7 The relative sea level trend for central Lancashire is characterised by early isostatic rebound and subsequent eustatic sea level rise. However, most of the direct understanding of sea level is from the Holocene, with relatively little evidence preserved in the way of Late-Glacial marine features or sea-level index points. For the Holocene, extensive research by Tooley and co-workers has identified that the marine inundation of Morecambe Bay probably commenced 10,500 years ago, with relative sea level at approximately –17m OD (Tooley 1974; 1978; Huddart *et al* 1977). Eleven marine transgressive stages were identified by Tooley from the Holocene stratigraphy and dunes in the area of Lytham (Fig 5). With additional data, 28 index points were used by Zong and Tooley (1996) to produce a time-altitude plot of relative sea level for Morecambe Bay (Fig 6). The Lancashire data have also been incorporated within Post-Glacial rebound models for this region of the British Isles, with the most recent refinements by Peltier *et al* (2002) and Shennan *et al* (2006) showing rapid rise in relative sea level to *c* 1.5m above OD around 6500 years ago, and a fluctuating sea-level fall to current levels over the last 5000 years. These models, however, are still constrained by the limitations of present knowledge with regard to the dimensions of the Irish and Irish Sea ice sheets, the rates of ice retreat across the Irish Sea, and the behaviour of differing ice-streams during deglaciation from the last glacial maximum. Varying sea levels clearly provide differing base levels to which rivers grade, and so have much affected the development of the Ribble and other rivers in Lancashire, for reaches that currently grade to sea level. The headwater reaches which grade to bedrock-controlled nick-points would be less affected by these changes.
- 2.2.8 The objectives of this study were to improve an understanding of the geomorphology and late Pleistocene development of the Ribble Basin, partly driven by an ambition to improve understanding of the distribution of sand and gravel reserves, but also to understand the area's geoarchaeological heritage. Previous research on the fluvial landforms and landform development in north-west England is somewhat limited, as is shown by the national-scale database compiled by Macklin and co-workers (Macklin and Lewin 1993; Lewin *et al* 2005; Macklin *et al* 2005; Johnstone *et al* 2006). The upland reaches of the Hodder and the Lune have received considerable attention, focusing upon hillslope processes and landform development during the Holocene, reviewed in

Harvey (1997) and Chiverrell *et al* (forthcoming). The River Dane, in Cheshire, part of the Mersey/Weaver basin, has also received some attention, and Chiti (2004) has examined the fluvial development of the Lower Ribble. However, an understanding of the broad-scale Post-Glacial landform development within these river systems is somewhat lacking and is not underpinned by comprehensive geochronological research; this understanding lags behind that available for adjacent regions, for example the north-east of England. This study attempts to redress this, with a clear focus on the fluvial development of the entire Ribble basin.

2.3 PREHISTORIC ARCHAEOLOGY AND PALAEOENVIRONMENT

- 2.3.1 ***Upper Palaeolithic Period (11,000-8000 BC)***: the ‘Old Stone Age’, the time of the earliest stone-tool-using cultures, spans the first settlement of Britain from the middle to the end of the Pleistocene era, between 500,000 and c8-10,000 years ago. During this period at least six glacial cycles occurred, until the end of the last great Ice Age, c10,000 years ago (Gresswell 1967b). It is evident that the occupation of the North West was dependent upon the cycles of glaciation, and the region was essentially an unoccupied icy waste during each glacial period. As the ice retreated and the climate became warmer in the Late Devensian interstadial, the vegetation on the drier land was an open birch, juniper and willow scrub with a rich herbaceous flora. This was ultimately replaced by more open grassland with less stable soil conditions as the climate became colder (Middleton *et al* 1995; Hodgson and Brennand 2006). An early undated pollen study by Pigott and Pigott (1963) from Malham Tarn shows that sedimentation started in the Late Devensian and records a temporary amelioration of the climate in Late Devensian II, when a community of juniper with a rich assemblage of herbaceous plants grew on the limestone areas.
- 2.3.2 The earliest evidence for human activity in the region all falls into the late Upper Palaeolithic date range (c16,000-8000 BC). The most famous find from Lancashire was that of an elk at Poulton-le-Fylde in 1970 (Hallam *et al* 1973), in peat, the body having flint points embedded in its leg and ribs, indicating that human hunting groups were present in the area. This has been dated to 13,417-11,769 cal BC (12,400±300BP; OxA-1500; Jacobi *et al* 1986), although it has been suggested that the sample was contaminated and that the date may be flawed (Middleton *et al* 1995). Elk have been found elsewhere, at Carnforth quarry, Lancashire, where extraction works revealed an antler of the *Megaloceros* or Giant Antlered Elk in 1973, a species which was known to be extinct by 8000 BC (Young 2002). At Victoria Cave, Settle, North Yorkshire, near the source of the Ribble, there is a repeated, albeit extensive, use of the cave from this time onwards (LUAU 1995a; Chamberlain and Williams 2001) (Figs 7, 8).
- 2.3.3 ***Mesolithic period (8000-4000 BC)***: the landscape during the Mesolithic period was largely wooded, the birch woods of the early Holocene (Flandrian) being replaced by dense hazel woods with pine, before a mixed deciduous forest developed. Towards the end of the period there is evidence of small-scale temporary clearances in this woodland (Hibbert *et al* 1971; Cowell and Innes 1994).

- 2.3.4 There is more information regarding settlement patterns and human society in Britain as a whole at this time. However, there is a lack of physical remains and the record is dominated by either individual isolated artefact finds or scatters of lithic material, of which the latter is taken as being the best indicator of settlement (Middleton *et al* 1995). The assemblages of Mesolithic material from Lancashire are found in both upland and lowland areas (Fig 8).
- 2.3.5 **The Upland Evidence:** the earliest records of flint artefacts are from those upland areas where the exploitation and erosion of peat deposits has exposed prehistoric ground surfaces. This, in conjunction with an interest in artefact collecting during the later nineteenth and into the twentieth centuries, has resulted in the recovery of thousands of flint tools of both earlier and later Mesolithic tool types and technologies (Hallam nd).
- 2.3.6 The central Pennine uplands of Lancashire and Yorkshire have provided one of the greatest concentrations of Mesolithic sites in the country (Fig 8) (Hodgson and Brennand 2006). Evidence of activity has been found on the western edge of the Lancashire Pennines, for example on Saddleworth Moor (Jacobi *et al* 1976). Further west, on the Anglezarke and Rivington Moors, the erosion of the peat caused by uncontrolled accidental or deliberate burning, drainage and other agents has led to the underlying mineral soils being exposed, and the recovery of extensive flint scatters (Howard-Davis 1996, 138-43; OA North in prep). One of the more significant sites was an early Mesolithic working floor at Rushy Brow, Anglezarke, tentatively dated to the eighth millennium BC. The assemblage here comprised over 400 fragments of flint and chert, with a small posthole structure, perhaps a wind break (Howard-Davis 1996). In contrast to these, the Forest of Bowland has so far revealed relatively few Mesolithic finds (OA North in prep; LUAU 1997a). The pollen evidence suggests that at this time the upland landscape was largely wooded, but with temporary clearance evidence, charcoal suggesting that the vegetation was being burnt (OA North in prep). This vegetation cover is substantiated by other studies from the region (for example Barnes 1975; Tooley 1978).
- 2.3.7 **The Lowland Evidence:** the palaeoenvironmental evidence for activity in the lowland zone of the Ribble Valley is limited (Fig 9). There is some evidence for the Mesolithic environment at Lower Brockholes (Chiti 2004), where a wooded landscape with alder growing close to the Ribble was recorded, but with some clearance phases related to a substantial peak in charcoal particles.
- 2.3.8 In the Upper Ribble Valley, pollen diagrams from five sites in the Lowland Craven District of Yorkshire (Bartley *et al* 1990) indicate that much of the area would have been covered by birch woods, but the subsequent invasion by hazel, pine and the broad-leaved trees c 9155-8455 cal BC differed from site to site. The next major change to the vegetation took place with the rapid expansion of alder, which was dated to 6595-6261 cal BC (7590±70 BP; SRR-2487) at White Moss, although at other sites pine seems to have remained important for longer, perhaps reflecting differing geology and topography (Bartley *et al* 1990). Unlike the lowland mires to the west, there is no evidence of burning in the Mesolithic period from Lowland Craven (Bartley *et al* 1990), although on the higher ground at Malham Tarn (Pigott and Pigott 1963; Fig 9) and Great Close Pasture (Smith 1986) there is evidence for burning associated with clearance activity. At Great

Close Pasture, in particular, this clearance is related to the finds of abundant Mesolithic artefacts in the area.

- 2.3.9 Evidence of Mesolithic activity has been recovered from lowland, coastal and estuarine sites of Lancashire over the last 20 years, as a result of systematic surveys (Cowell 1991; 1992; Cowell and Innes 1994; Middleton *et al* 1995). In addition, there has been a general increase in commercial archaeological projects, which have occasionally revealed Mesolithic material.
- 2.3.10 Cherry (Cherry and Cherry 2000) has suggested that there may be a link between Mesolithic sites in eastern Cumbria and in Craven as a result of the presence of chalk flint at Levens Park, south Cumbria. This would suggest the use of the Lune and Wenning river valleys as both communication and trade routes, as well as for settlement sites. The Lune and Ribble Valleys would both have provided natural corridors and there is evidence indicating Mesolithic activity along them. Halton Park and the river terrace at Caton have both yielded typologically late Mesolithic material along the Lune Valley, for instance (Middleton 1993; OA North 2006).
- 2.3.11 Along the Ribble Valley, the site of Marles Wood (Fig 10) has produced a substantial number of later Mesolithic flints (HER PRN2894; HER PRN1868; R Cowell *pers comm*). This major find was thought to be *in situ* but, given excessive disturbance by tree roots, no stratigraphic separation of individual episodes of flint working could be determined. Despite this lack of stratigraphy, it is evident that the site represents a considerable episode of activity, although whether it was a settlement or working site / temporary camp is unknown. In addition to the flints, a 'spearhead and canoe fragment were found in 1942, at the bend in the river at the same depth in the gravel. It is reported that they were 15 feet below the bed of the Ribble, a depth which invites comparison with the lower gravels of the Preston Dock area' (HER PRN1872). Stray surface finds could also be indicative of larger deposits which remain sealed below the alluvial deposits, in the earlier gravel terraces.
- 2.3.12 It would appear that the Mesolithic evidence, though only sparse within the study area, suggests that there is a pattern of land use based on estuaries and river valleys, in addition to activity in the uplands. While there is some similarity to the pattern of late Upper Palaeolithic settlement / activity, it is also evident that there was a substantial increase in activity and that this extended onto the adjacent uplands, albeit on a transient basis.
- 2.3.13 **Neolithic period (4000-2000 BC):** the Neolithic period provides considerable evidence for significant changes in society in Britain, which includes the emergence of social stratification and the increase in the archaeological record of evidence for elite groups. Ceremonial monuments, henges, stone circles and mortuary structures all appear and a gradual reduction in group mobility from the end of the Mesolithic period is evident, reflecting the gradual abandonment of a hunter-gatherer lifestyle and the establishment of more permanent settlements associated with the adoption of agriculture (Edmonds 1999). The first indicator would seem to be forest clearance; however, such activity is now considered to extend back into the Mesolithic period and perhaps relates to hunter-gatherer activities (Middleton *et al* 1995, 203). A more reliable indicator for agriculture is the appearance in the pollen record of cereals, approximately at the time of the elm decline, possible early cereals having been found at

Knowsley Park, Merseyside, dating to 4340-3970 cal BC (Cowell and Innes 1994, 148). Generally, a pattern of early clearances and early indicators of cereals is seen at coastal sites (Bradley 1978, 9) and would suggest that this was the primary context for early settlement.

- 2.3.14 *Neolithic Palaeoenvironment of the Ribble Valley*: regionally, there is a rich palaeoenvironmental record, although lowland sites are more frequent than those from the uplands. An extensive body of research from Lancashire (eg Barnes 1975; Tooley 1978; Middleton *et al* 1995; Howard-Davis 1996; Fig 9) demonstrates a regional pattern, episodes of temporary woodland clearance followed by regeneration. Early cereal cultivation is consistently present in the pollen record throughout the region, but becomes less frequent in later Neolithic records. In the Lower Ribble Valley the only record to date is from a buried palaeochannel at Lower Brockholes (Chiti 2004; Fig 9). The truncated pollen profile suggests that woodland dominated the landscape in the early Neolithic period before the site reflooded, possibly as a result of clearance in the catchment area (*ibid*).
- 2.3.15 In the Upper Ribble Valley, the elm decline has been dated to 4044-3537 cal BC (5010±110 BP; Birm-663) and 4222-3851 cal BC (5080±100 BP; Birm-665) at Eshton Tarn (SD 918 576) and White Moss (SD 792 546). However, the data suggest that levels of anthropogenic activity were variable at the two sites after the elm decline. At Eshton Tarn, temporary clearances are recorded, with the first major clearance dating to 2275-1691 cal BC (3600±100 BP; Birm-662) in the early Bronze Age (Bartley *et al* 1990). However, at White Moss (Fig 9) there is little evidence of anthropogenic activity until the early medieval period (*ibid*). The pollen evidence from Lowland Craven illustrates a more varied history than that from the lowlands of north Lancashire, south-west Lancashire, Greater Manchester and north Merseyside. This may reflect greater archaeological activity on the limestone surrounding the Upper Ribble than to the west of the Pennines.
- 2.3.16 *Archaeological Resource*: the main evidence for Neolithic settlement in the region is lithic scatters, and the distribution of these shows a pattern of land use around river valley bottoms and coastal lowlands (Middleton *et al* 1995) very much like the Mesolithic pattern, indicating some continuity of preferred areas, for example at Friar's Hill, Over Wyre, where the same sand island was exploited in the late Mesolithic and the early Neolithic periods (Middleton *et al* 1995, 204). There is a distinct change in the nature of the artefacts during the period, in particular the appearance of single-piece leaf-shaped arrowheads and polished stone axes. The pattern of stone axe finds tends to result from a combination of casual loss and ritual deposition (Bradley and Edmonds 1993), and where thin-section analysis has been undertaken, the majority in Lancashire originate from Great Langdale in Cumbria (Clough and Cummins 1988). As Middleton states 'the axes from Lancashire have a definite riverine and mossland distribution... It is now clear, however, that many of the axes must have been deposited deliberately and the rivers had a specific significance' (Middleton 1996, 38). A group of eight polished axes were found at Pilling Moss, and a pair were found at the Delph Reservoir on Bolton Moor (Fig 8).
- 2.3.17 The first use of pottery provides a new durable artefact in the archaeological record. Its movement has been attested by finds throughout the North West and,

in particular, 'food vessels are found in the valley of the Aire, passing westward into the Ribble and Irwell drainages of Lancashire' (Raistrick 1939). At Portfield Camp, Whalley, excavations of a later Bronze Age / Iron Age hillfort also revealed a pair of truncated pits which contained nine sherds of Neolithic Grimston-style pottery, as well as flint-work and leaf arrowheads scattered across the site (Beswick and Coombs 1986). The indications would appear to demonstrate Neolithic settlement on the site of a natural promontory, which was subsequently used as a defensive feature. These Neolithic features, despite being severely truncated, can be likened to contemporary settlements found in the south of England (Middleton 1996).

- 2.3.18 A site at Pilling Moss produced an assemblage of flints on the eastern edge of the moss, on an area of well-drained gravel, surrounded by the heavy boulder clay that was much less suited to agricultural practices because of its inherent poor drainage. Indeed, the most likely places for the preservation of later prehistoric material are within the areas of river gravels, where the geological history indicates that they will be buried beneath fluvial deposition episodes. This can be demonstrated at the site of St Michaels, on the floodplain of the River Wyre (Fig 8), where Neolithic flints and pottery were discovered and a peat lens was dated to 4325-3966 cal BC (5286 ± 80 BP; GX-17293) and 4316-3810 cal BC (5230 ± 80 BP; GX-17294) (Middleton *et al* 1995, 58). Plant remains taken as indicators of settlement were buried beneath 2m of alluvium. They included pollen and macrofossil evidence, the former suggesting small-scale clearance of the local carr vegetation. A tentative identification of possible cereal pollen towards the top of the peat suggested cereal cultivation. The macrofossil evidence contained high values of charcoal throughout the profile, suggesting *in situ* burning (*ibid*).
- 2.3.19 The other significant change in the archaeological record is the first appearance of formal burial monuments, specifically long barrows and cairns. The evidence in Lancashire is sparse in comparison to neighbouring areas, but equally a systematic survey of monuments is lacking in Lancashire, particularly in upland areas. However, there are two examples of chambered cairns known, both on Anglezarke Moor, east of Chorley (Howard-Davis 1996).
- 2.3.20 The most well known of these is Pikestones, on the south-west-facing slope of the moor, a stone-constructed cairn over a burial chamber with a short passage leading to an external facade (Middleton 1996; Bullock 1958); however, much of the stone covering has now gone, leaving the cist free-standing. During a survey of Anglezarke in 1984, a round chambered cairn was found on the west-facing slope of the moor, which bears some similarities to the megalithic tombs of North Wales (Howard-Davis 1996, 145; Bron Y Isaf; Powell *et al* 1969, 125-6).
- 2.3.21 **Bronze Age (2000-800 BC):** the Bronze Age was essentially a period of consolidation after the massive revolutionary upheavals of the Neolithic period. There was an expansion of forest clearance, which extended onto the marginal uplands, and a substantial increase in the number of identified settlement remains (OA North in prep). Many of these are within an upland context, in part reflecting the improved survival of archaeological remains within lands that have subsequently seen little exploitation.

- 2.3.22 **Palaeoenvironment:** regionally, there is a rich palaeoenvironmental record for the Bronze Age, although lowland sites are more frequent than those from the uplands. There is, however, little to distinguish the vegetation of the Bronze Age from that of the Neolithic period, with a continuing pattern of temporary woodland clearance episodes followed by regeneration. The only difference is that these episodes were possibly more marked and cereal cultivation less frequently recorded, perhaps reflecting a pastoral economy.
- 2.3.23 In the later Bronze and early Iron Ages, a low but consistent level of interference with the vegetation is recorded in the pollen diagrams from Fenton Cottage and Winmarleigh Moss, Lancashire (Middleton *et al* 1995; Wells *et al* 1997; Wells and Hodgkinson 2001; Fig 9). The tree pollen recorded in these diagrams suggests that although woodland dominated the landscape it was of a secondary character, alder and hazel dominating rather than oak and elm. However, at Briarfield Nurseries, Poulton-le-Fylde (SD 337 389), where a late Bronze Age human skull, dated to 1212-843 cal BC (2845±65; AA-28733), was discovered in peat, the pollen data suggest that there was a higher level of anthropogenic activity surrounding this site than at others in Lancashire (Huckerby 2001).
- 2.3.24 In contrast, in the Upper Ribble Valley the first major clearance was dated to 2275-1691 cal BC (3600±100 BP; Birm-662) in the early Bronze Age at Eshton Tarn. At this site the intensity of arable cultivation increased in the Middle Bronze Age, indicated by a rise in the values of cereal pollen, dated to 1626-1216 cal BC (3160±80 BP; SRR-2481). At this time the pollen record also suggests that the limestone grassland seen today formed (Bartley *et al* 1990). However, at White Moss, there is little evidence of anthropogenic activity until cal AD 353-772 (1470±100 BP; SRR-2488). In the Bronze Age, the history of the vegetation of Lowland Craven exhibits a greater difference between the Neolithic and Bronze Age than in the lowlands of north Lancashire, south-west Lancashire, Greater Manchester, or north Merseyside. This may reflect more intensive archaeological activity on the limestone surrounding the Upper Ribble than to the west of the Pennines.
- 2.3.25 The evidence for Bronze Age activity within the region is well documented, one of the most distinctive features in Lancashire being the large numbers of stray finds (Middleton 1996). These are distributed across the region, with clusters in the river at Preston (HER PRN296), a group of three found at Longridge (HER PRN2660, PRN147, PRN1789), and one at Broadgate, Preston (HER PRN101). This would seem to point to the probable importance of the Lune and Ribble Valleys as natural corridors (Middleton 1996).
- 2.3.26 **Preston Docks:** during the construction of Preston Docks (Fig 11), around 1885, several prehistoric finds were made. These included a bronze spearhead, two wooden dug-out canoes, and the skulls of approximately 24 humans (Dickson 1887) Along with these were the remains of skulls and antlers of 100 red deer, the skulls and horns of 43 wild cattle and some horse remains. The finds were located between 3.9m and 4.5m below the ground surface. A flint arrowhead was also found in the Edward Albert Dock (Middleton 1996). A similar deposit was found at Marles Wood, where a bronze spearhead and a fragment of wooden canoe were found about 5m into the river gravel (HER PRN1872; HER PRN1015).

- 2.3.27 The large number of animal remains from the dock could suggest two broad possibilities. Firstly, occupation and/or the processing of animals was occurring in the immediate vicinity, but it would appear that a second possibility must be considered: the whole assemblage from the dock is not of one period, and they were not stratigraphically distinct. The circumstances of discovery did not accurately locate spatial deposition patterns or other such data, as a modern excavation would. The long use of the River Ribble as a means of trade and transport is illustrated by these prehistoric finds, as well as those from Marles Wood. It is possible that Preston Docks may have been the final resting place of objects which had been washed downstream, suggesting that prehistoric deposits may be concentrated in the estuary areas and scattered along the valley bottoms.
- 2.3.28 In addition to this, a hoard of axes was found in the Ribble in the 1800s (Burgess 1968), and a bronze spear tip at Chatburn, at the confluence of the Chatburn Brook and the Ribble (HER PRN199). A second bronze spear was found at West Bradford (HER PRN308), and a bronze rapier at Bungerely Farm, south-east of Waddington (HER PRN0794).
- 2.3.29 **Settlement Remains:** the general pattern of finds and monuments suggests that a much wider use of the landscape was occurring. In particular, the uplands seem to have been exploited through the second millennium BC, a period when the pollen records from Forest of Bowland and Anglezarke show that there was an increase in human impact on the natural environment (OA North in prep). Although the evidence of upland settlement is not as extensive and widespread as it is from Cumbria, there are nevertheless reliable indicators of Bronze Age land improvement and farming within this zone. At Nicky Nook, on the western slopes of the Forest of Bowland, a relatively sizeable cairnfield on a gently sloping plateau has 57 randomly distributed clearance cairns (OA North in prep). There were no indicators of associated settlement, however, and it is probable that any domestic structures were wooden and have not survived as surface evidence.
- 2.3.30 At Anglezarke (Fig 11), there were also clearance cairns and a putative cairnfield on Stronstrey Bank, which is a very distinctive natural terrace, both elevated above the adjacent low-lying plain, and relatively flat (OA North in prep). It is thus comparable to western Cumbria, where such terraces invariably were covered in cairnfields (Quartermaine and Leech forthcoming). These most often reflect Bronze Age land improvement, and it is tempting to relate those at Anglezarke to a major clearance episode dated to the late Neolithic/early Bronze Age, identified at nearby Hurst Hill (Bain 1991; OA North in prep).
- 2.3.31 Settlement sites on the lowlands are again invariably defined by flint scatters, in part because the structural remains may not have been very substantial. At Bonds Farm, Pilling Moss (Fig 11), a Bronze Age artefact scatter was excavated (Edwards 1991), revealing a group of postholes and stakeholes, in no particularly discernible pattern. The implication is that this was a transient settlement, and the structures were little more than tents.
- 2.3.32 **Funerary Remains (Fig 12):** burial remains are well represented in the form of substantial cairns. Such cairns seem to have been placed on areas of waste land and often on high, prominent places with a wide vista. Notable examples are two round cairns on Winter Hill (Bu'lock *et al* 1960), which are on the cusp of the flat summit and have extensive north-facing vistas, and also a prominent round

cairn (c15m diameter) at Cat Knot Well (SD 7216 5986), which is situated on the sky-line of the broad plateau of Hasgill Fell, Forest of Bowland (LUAU 1997a). Burial monuments of this period display considerable variation of form, and include a significant number of annular monuments, which ultimately evolved from the Neolithic stone circle. A classic example is the Bleasdale timber circle on the lower slopes of the Forest of Bowland near Chipping, which is a multi-phased funerary monument, dated approximately to 2200 BC (Varley 1938). It comprises an outer enclosure with a small circle of timber posts within, and to one side of it is a burial from which two urns and a cup were recovered. It is not known if the small timber circle was contemporary with the outer enclosure, or whether this was part of a later phase of activity.

- 2.3.33 Although the better examples are from the uplands, lowland contexts are also represented, but again usually on waste land. Within the study area, at Winckley Lowes, on the floodplain of the Ribble near the confluence of the Rivers Ribble, Hodder and Calder, were two cairns that have been investigated, one of which is possibly considered a glacial feature. The larger of the two, Winckley Lowes I, was an irregularly shaped bowl barrow surviving up to 2.5m high with a maximum diameter of 60m south-west/north-east by 35m south-east/north-west, constructed of earth and stones. The centre of the monument was subject to limited antiquarian investigation in 1894. Members of the local Stoneyhurst College located a primary burial consisting of a cairn of large stones beneath which was a human cremation lying on top of a thin layer of charcoal. Three secondary cremations were found nearby, one was accompanied by pieces of pottery and a flint scraper. A quantity of animal bone was also found cremated burial (HER PRN23711).
- 2.3.34 Burials are not exclusively in high-status monuments, and there are also finds of simple cremations, of which the most notable example from the study area was from Ribchester. There, excavations within the Roman extramural settlement revealed a truncated ditch that was dated to c1600 cal BC, and within the ditch were five in-urned cremations (Olivier 1981).
- 2.3.35 **Bronze Age / Iron Age Transition:** the end of the Bronze Age saw a change in the pattern of land use, and it seems that some of the upland areas were abandoned, with a move towards enclosed settlement. This can be seen at Portfield Camp (Fig 11), Whalley, where a defended enclosure has been dated to the later Bronze Age (Beswick and Coombes 1986). A hoard of Bronze Age artefacts, including a gold ring and bracelet, were found in the 1960s during the laying of a pipe across the enclosure (HER PRN1176). Further south-west, on the Ribble, are two definite (HER PRN12914, Fishwick Allotments; HER PRN1293, Frenchwood Knoll, east of the current Avenham Park) and four possible sites (HER PRN15239, Mete House Wood, Fishwick; HER PRN15240, Brockholes Wood; HER PRN15241, Bolton Wood; and HER PRN15242, Red Scar Wood). If these putative promontory forts are proved to be of later Bronze Age or early Iron Age date, then it would indicate concentrated occupation of the valley bottom during this transitional period.
- 2.3.36 Multi-proxy indicators from peat bogs throughout north-west England suggest that there was a sharp downturn in climatic conditions in the first millennium BC, with a significant expansion of the wetlands within the range of c 900-400 cal BC, both in the lowlands and the uplands (Middleton *et al* 1995, 196; OA

North in prep; Bain 1991). This is also the date range for the *Grenzhorizont* of Weber (1926, cited in Middleton *et al* 1995) and Granlund's RY4 (1932). This recurrence surface has been recorded in bog stratigraphy throughout Northern Europe and Turner (1981), in a review of the evidence, concluded that it was highly likely that climatic changes caused this horizon to form. The rapidly expanding mires would have severely restricted the area of land available for cultivation, perhaps causing a decrease in the population.

- 2.3.37 **Iron Age:** the climatic deterioration continued into the Iron Age. There was an abandonment of the upland settlements and clear evidence of woodland regeneration from the early Iron Age within the pollen sequences of the region, which is coupled with proxy climatic indicators, for example recurrence surfaces in peat bogs, that clearly indicate a deterioration in climatic conditions. However, there was also a corresponding recovery, with extensive clearance represented in the later Iron Age; arable cultivation is clearly recorded in the pollen diagram from Fenton Cottage (Fig 11), (Middleton *et al* 1995; Wells *et al* 1997) and also in one from an upland site at Fairsnape Fell in the Forest of Bowland (Mackay and Tallis 1994). There is a little data that record the palaeoenvironment of the later Iron Age in the Lower Ribble Valley, from pre-rampart buried soils at Ribchester (Buxton *et al* 2000, 21-3). There, local alder carr grew beside the river before two periods of major agriculture activity, the second episode being one of intensive cultivation prior to the construction of the earliest rampart.
- 2.3.38 The Upper Ribble Valley demonstrates considerable differences in the pollen record. At Eshton Tarn, there were continued high levels of anthropogenic activity, both of arable and pastoral farming, throughout the Iron Age, whereas at White Moss, to the west of the Ribble in Lowland Craven, there was little evidence of either clearance or arable cultivation (Bartley *et al* 1990).
- 2.3.39 **Archaeological Evidence:** the evidence for Iron Age activity in Lancashire is quite sparse, aerial surveys (Higham 1980) locating only a few sites. There are of course also a few classic hillfort sites, presumably resulting from the increasing competition for agriculturally viable land that had diminished as a result of the climatic decline. The most notable hillfort is that on Ingleborough, near the upper reaches of the Ribble. This is a single vallate fort established across the flat-topped summit of this 723m high mountain in the Yorkshire Dales (Figs 11, 13). The rampart comprises a gritstone wall between 3m and 5m thick, and survives to a maximum height of 3m. The single rampart indicates that it could rely on the very steep-sided, natural defences of the mountain. Internally, it has 20 stone-founded roundhouses that are between 5m and 8m in diameter (Bowden *et al* 1989).
- 2.3.40 Closer to the Ribble is the site of Castercliff (Fig 11), near Nelson, overlooking the Calder Valley, which is a small multivallate hillfort. It covers an oval plateau measuring approximately 115m by 76m, enclosed on all sides, except the north, by three rubble ramparts, each up to 1.5m high, situated on the slope of the hill, with an external ditch up to 1.5m deep in front of each. Limited excavation of the defences indicated that the inner rampart was revetted with stone and also timber-laced. Initially thought to have been constructed in the first century BC, it is now thought that the site was actually constructed during either the sixth or seventh centuries BC (Challis and Harding 1975; Williams 1993). Similarly,

Portfield Camp, Whalley, may also have continued into the Iron Age (Haslegrove 1996).

- 2.3.41 *Artefactual Evidence:* much of the evidence for the Iron Age in the region derives from isolated finds. Iron Age-type metalwork has been found: a beaded torc in Rochdale; a sword and dagger from Warton; and a dagger scabbard preserved at Pilling Moss (Haslegrove 1996). The deposition of human bodies in mosses and bogs is also known from the period, bodies having been recorded from Pilling Moss (Fig 11), Red Moss, near Bolton and from Lindow Moss (Stead *et al* 1986).
- 2.3.42 There is an apparent contradiction between the dearth of confirmed Iron Age sites and the palaeoenvironmental evidence that indicates increased activity and forest clearance in the later Iron Age. In part this reflects the dearth of reliably dated excavations on potential sites, and that there is a corresponding reliance on the typological dating of surface features. There is a now accepted realisation that in the North West (Quartermaine and Leech forthcoming) there was considerable continuity of settlement from the Iron Age into the Roman period, and sites that have the typical characteristics of a Romano-British settlement may in fact have Iron Age origins. For instance, a rectilinear, complex enclosed settlement at Ingleton, near to the northern reaches of the Ribble, morphologically was a classic Romano-British settlement, and the dates confirm that it was occupied during much of the Roman period; however, the earliest date (88 cal BC-cal AD 66 (2010 ± 28 BP; KIA 22910) indicates that it had an Iron Age origin.
- 2.3.43 Similarly, at Duttons Farm, Lathom, the remains of four roundhouses, paddocks and boundary ditches range in date from 170 cal BC to cal AD 410 (Cowell 2003), indicating that the farmstead was occupied through the Iron Age and into the Romano-British period. These sites highlight continuity of form between the Iron Age and Romano-British periods, and demonstrate that there are few grounds for reliably discriminating between Iron Age and Romano-British settlements purely on the basis of form; there is therefore a need to redefine the chronology of the period on the basis of absolute dating.

2.4 ROMANO-BRITISH ARCHAEOLOGY AND PALAEOENVIRONMENT

- 2.4.1 The knowledge base and understanding of the Romano-British period is greater than that of any preceding period, reflecting in part the literary accounts of the peoples and places, ranging from ‘histories’ to inscriptions. A great deal of research in the north has focused on the Roman military and in particular the northern frontier system; the principal elements of this within the study area are the forts at Kirkham and Ribchester, and a military depot at Walton-le-Dale (Fig 14).
- 2.4.2 The establishment of key military sites dates back to the Governornship of Petilius Cerialis, from AD 71. Three temporary camps have been identified at Kirkham, succeeded by a small installation on the summit of the hill, perhaps a fortlet (Howard-Davis and Buxton 2000). This may have acted as a beacon to connect the Fylde Coast to Ribchester, via the river itself and the roads running along it. Kirkham was linked to the other forts in the Ribble Valley by a road running along the north bank of the river (Shotter 2004).

- 2.4.3 **Ribchester:** Ribchester (*Bremetenacum*), on the northern edge of the Ribble floodplain, has been known as a major Roman establishment since the writings of Leland, the sixteenth-century antiquarian (Figs 15, 16). It is famous for the discovery of a fine Roman cavalry parade helmet, now in the British Museum, and frequent excavations have taken place during the nineteenth and twentieth centuries (Edwards 2000). The number of archaeological interventions in Ribchester (about 110 excavations, evaluations, and watching briefs from 1811 to 2003) is probably greater than for anywhere else (Philpott 2006).
- 2.4.4 The Roman military presence here probably began during the campaigns of Petillius Cerialis in the early AD 70s (Shotter 1999; Buxton and Howard-Davis 2000). The site is well placed at the western end of one of the few major trans-Pennine routes (taking advantage of the natural river valley corridor), and sits at the junction with the north/south road, linking it to Lancaster. It overlooks a fording point on the river and is sited at what was the most easterly navigable point of the river. The first phase of the fort was of timber and turf construction, the rampart built on a corduroy foundation and incorporating a wooden gateway. The rampart was fronted by a double ditch, which was later replaced by a single ditch (Buxton and Howard-Davis 2000).
- 2.4.5 The renovation of the fort, probably in the late AD 70s or early 80s, was associated with the Agricolan campaigns. The rampart was extended and the inner ditch recut, with the immediate area cleaned and new buildings erected to the north. There was a possible builders' yard, which gave way to fences associated with stable waste and manure, and may represent external horse pickets (Buxton and Howard-Davis 2000).
- 2.4.6 The timber fort was demolished prior to its replacement in stone in the early second century. During this operation, the site was protected by a ditch. This was subsequently and rapidly backfilled with a large amount of organic refuse, including leatherworking waste, cavalry fittings and the bodies of horses. This material seems to have been derived from buildings which had been cleared out and demolished. The turf and timber rampart was flattened and a new rampart built to the north, while elsewhere it was refaced with stone (*ibid*). This stone fort remained in occupation until the end of the Roman period.
- 2.4.7 A road extended north-west from the fort towards Kirkham, along which were insubstantial structures that were later replaced by a stone building displaying some evidence for high status. Other large stone buildings were erected elsewhere in Ribchester at about the same time, and the extramural settlement was defined or defended by a substantial ditch. The end of this phase of activity seems to have occurred around AD 135, after which the large building was left to decay (Olivier 1981). Coin evidence suggests a winding down of activity in this part of Ribchester during the Antonine period, when the ditch of the stone fort was allowed to silt up and become overgrown, an action perhaps associated with the blocking of the west gate. The area excavated then fell into decline and was completely abandoned except for the disposal of refuse by the end of the second century. The preservation of artefacts and ecofacts by waterlogging in the excavated area has allowed for an unusually wide range of multidisciplinary studies which greatly enhanced the evidence for daily life, hygiene, diet and other important aspects, which are not often recovered on sites where preservation is poor (Buxton and Howard-Davis 2000).

- 2.4.8 **Walton-le-Dale:** the Roman military site of Walton-le-Dale was explored between 1947 and 1960 (Pickering 1957) (Fig 17), and more extensively in 1981-3 and 1996-7. These works revealed a complex and significant site which seems to be a depot with a very strong Roman military influence, characterised by the layout, function and nature of the structures and associated features, as well as the assemblage of finds (Gibbons *et al* forthcoming).
- 2.4.9 The coin evidence indicates a Roman presence at the site from the mid first century AD, based upon the discovery of a group of *aes* coins which are distinctive copies of Claudian coins and thought to have circulated during the mid-50s to mid-60s (Sutherland 1937). However, the first phase of Roman building has been assigned an early second-century date, comprising a wide road running through a complex of uniformly built timber buildings. There were some variations in the internal layout of these buildings and they contained evidence of hearths /fire boxes or pits (Gibbons *et al* forthcoming).
- 2.4.10 The site was redeveloped essentially to the same general layout but with the individual buildings increasing in size, with a more complex and permanent water supply being established (Buxton and Shotter 1996). A third phase of remodelling occurred during the mid Antonine period. The excavations revealed furnaces / fireboxes, but little evidence of industrial refuse or slag, so the precise nature of the industrial processes has not been resolved. There exists the possibility that this was a storage and distribution depot, and some of the buildings may have served as warehouses (*ibid*). The possibility that less durable goods were being constructed, such as rope or sail cloth or even shallow-draught boats, as well as the area being used as a port or harbour, cannot be discounted.
- 2.4.11 **Native Settlement:** despite the work on these military sites, the processes and strategies of the occupation still remain only partly understood, as is the relationship between the native Briton and the Romans. Beyond the major towns and forts, there has been little research on native settlement; however, over the last few years new discoveries have allowed a new understanding of rural settlement. Metal detecting and other chance finds reported to the Portable Antiquities Scheme have greatly increased the number of Roman objects from a rural context, and aerial photographic surveys have increased knowledge of the settled landscape of the Later Iron Age and Romano-British periods. Remains of Romano-British field systems have been found within the Lune Valley, at Eller Beck, where over 60ha of field systems and associated settlements have been recorded (Higham and Jones 1985; RCHM(E) 1998; Bewley 1996; Fig 14). The excavation of several settlements has also provided a much needed absolute chronology to reinterpret rural settlement, previously reliant on typological dating.
- 2.4.12 Palaeoenvironmental evidence shows that woodland clearance during the late Iron Age intensified during the Romano-British period. Pollen data are however absent from the Lower Ribble Valley, but information is available for the broader area. The extensive clearance activity recorded in the Late Iron Age at Fenton Cottage, in the Fylde (Middleton *et al* 1995; Wells *et al* 1997), continued into the Roman period, with clear evidence of cultivation.
- 2.4.13 In the Upper Ribble Valley and on Fairsnape Fell (Mackay and Tallis 1994), there was also continuity of clearance, and at Eshton Tarn, in Lowland Craven (Bartley *et al* 1990), there was a continuing anthropogenic presence throughout

the Roman period, whereas at White Moss, west of the Ribble, the pollen evidence suggests that there was very little anthropogenic activity until the early medieval period.

- 2.4.14 ***Roman Remains in the Ribble Valley:*** within the study area are 90 definite Roman sites recorded in the HER, as well as three possible sites. Sixty-seven of these are either in Ribchester or are sections of Roman roads that converge on the town (Fig 18). The placement of the forts at Kirkham and Ribchester is likely to have been the stimulus to encourage the growth of settled communities in the area, providing a market for grain and meat production. This would mean that the remains of Romano-British field systems and farms should be expected dotted along the fertile plains of the Ribble Valley, yet no substantial remains have been identified. This may, however, reflect the fact that they lay on good agricultural land and have been lost to subsequent agricultural improvements (Shotter and White 1995), and is supported by the finding of 'a wide distribution of find spots of Roman coins in the Fylde area, even in places removed from the Roman roads and settlement' (Graystone 1996, 84).
- 2.4.15 The evidence from the North West generally, and Duttons Farm (Cowell 2003), Barker House Farm (OA North 2004), and Broadwood, Ingleton (Johnson 2004) (Fig 19), specifically, indicate that rural settlement was essentially of a native, Iron Age character. The houses were round and either stone founded or of timber and often revealed little in the way of Roman material culture. The implication is that, although the native Britons may have traded with their Roman overlords, there was relatively little cultural interaction between them in the rural hinterlands of the Roman installations.
- 2.4.16 The roads themselves have yielded a considerable amount of Roman coins, spanning the first to fourth centuries AD, as well as milestones and sculptures (Graystone 1996). At Elston Hall, on the Ribchester to Kirkham road, a hoard of *denarii* was found, and at Fulwood and Ribbleton, coins of Nerva, and at Red Scar, Haslem Park and Clifton, third- and fourth- century coins have been found. This concentration of finds apparently contrasts with the lack of finds on the road between Ribchester and York (Graystone 1996; Shotter 1999).
- 2.4.17 ***Roman Decline:*** during the second century AD the pacification and increasing stability of the area appears to have led to a scaling down of military activity. Evidence from Kirkham suggests abandonment, though the production site of Walton-le-Dale continued. Ribchester itself appears to have changed in function and become more of an administrative centre (Buxton and Shotter 1996).
- 2.4.18 The decline of Roman rule in Britain was one which occurred not as an event but as an extended process over the latter part of the fourth century, the most obvious symptom of the administrative decline being the reduced supply of pottery and coinage. During this period army units became in effect a local militia. From AD 402 there were no more supplies to pay the army (Shotter 2004, 153-74) and the ties with Rome were effectively cut, leaving the fort commanders as at least semi-autonomous leaders.

2.5 EARLY MEDIEVAL ARCHAEOLOGY AND PALAEOENVIRONMENT

- 2.5.1 ***Palaeoenvironment:*** following Rome's abandonment of the province, there appear to have been two phases of partial woodland regeneration, dated to cal

AD 349-583 (1590±50 BP; GU-5144) and cal AD 558-773 (1380±60 BP; GU-5143) at Fenton Cottage, Lancashire; these phases were separated by increasing levels of grassland in the landscape (Middleton *et al* 1995, 152; Wells *et al* 1997; Fig 9). The earlier period of regeneration is contemporary on the mire surface with a change in dominance from *Sphagnum imbricatum* to *S. sect Acutifolia* at cal AD 349-583 (1590±50 BP; GU-5144), suggesting a period of drier conditions at this time (Middleton *et al* 1995). There is extensive evidence for a drier period throughout the British Isles (Lamb 1977) and it seems likely therefore that the reduction in anthropogenic activity recorded was not caused by a deterioration in climatic conditions but by a genuine reduction in farming.

- 2.5.2 **Historical Evidence:** much of the evidence for the period following the end of Roman governance comes from early historical sources, but any references to the North West are usually quite general and often written with an agenda or from a specific standpoint; these include the *Anglo-Saxon Chronicle* (Garmonsway 1967) and the writings of Bede (RM Newman 1996).
- 2.5.3 **Archaeological Evidence:** in the North West there was a large concentration of Roman military installations, and associated infrastructure, and it has been suggested that many of these centres would have either stayed in use or been focal points after the Roman retreat (Higham 1994). In the Ribble Valley, Roman military sites would have been prime candidates for continued occupation as focal points, albeit not to the same scale as Carlisle (for historical sources see Webb 1998; McCarthy 2002). The military site at Ribchester, in particular, may yet yield evidence of later occupation, and any material seen as residual would benefit from re-investigation. However, the initial phase of social transition during and after the Roman withdrawal is an area that has so far yielded little information.
- 2.5.4 The emergence of a distinct material culture occurred from the eighth/ninth centuries onwards, although evidence for the middle centuries of the early medieval period depends heavily on both place-names of Old English and Scandinavian origin, with groupings of both found on the good agricultural land of the river valley floors (RM Newman, 1996; Higham 2004), and also in coastal areas (such as Kirkham (Kenyon 1991; Higham 2004)).
- 2.5.5 The Lune Valley has a concentration of stone sculpture with both Northumbrian and Scandinavian attributes, at Heysham, Halton and Lancaster (Fig 20), which indicate Christian sites in the eighth to tenth centuries (RM Newman, 1996). At Lancaster, a hoard of stycas was found at Vicarage Field (Penney 1981; Garstang 1906). A very significant burial mound was opened in 1822 at Claughton Hall (Fig 20), near Garstang, which revealed, as well as an urned cremation, an assemblage of ironwork that was of undoubted Norse origin, and included two very ornate tortoise-shaped oval brooches (Edwards 1998, 14-7). In general, a distinct pattern of settlement can be seen in the lower Lune Valley, and similar groups of material have been found in both the Irwell and Mersey valleys (RM Newman 1996).
- 2.5.6 The only surviving churches with early medieval fabric in the region are St Patrick's Chapel and St Peter's Church, both at Heysham, and a small part of the church at Lancaster. The fabric of both the church and chapel at Heysham has been dated to the late eighth century (Potter and Andrews 1994). Given the amount of sculpture at both sites, and the juxtaposition of the two churches at

Heysham, both they and the site of Halton church have been suggested as possible monastic sites (RM Newman 1996). The Ribble Valley has both Northumbrian and Scandinavian motifs on stone crosses at Whalley, and there is possibly another piece, now at Anderton, but which may have derived from Preston (RM Newman 1996). The church at Kirkham may have been in existence since *c* AD 700 (Middleton *et al* 1995).

- 2.5.7 ***Cuerdale Hoard (Fig 20):*** the most well-known find of the period within the study area is that of the 'Cuerdale Hoard'. This is the largest hoard of Viking hack silver and coins found outside Russia, and was discovered in the river bank near Cuerdale, outside Preston, in 1840 (Newman, RM 1996). The hoard contained over 8600 items, including silver coins and bullion, contained in a lead box (Edwards 1998).
- 2.5.8 In uncertain times, the safest way to store personal wealth was to bury it secretly, and it was clearly never recovered by its former owner, possibly because he was killed. The very varied nature of the hack-silver testifies to the mobility and far-ranging contacts of the Vikings. Much of it is of Norse-Irish origin, including distinctive stamped arm-rings, both whole and chopped up, and fragments of spectacular bossed penannular brooches and thistle brooches; such large and imposing items of personal jewellery were portable wealth as well as functional and decorative attachments.
- 2.5.9 The Cuerdale hoard contains over 7000 coins and between them they demonstrate very clearly the international scale of Viking activity, as well as providing evidence for the dating of the hoard. It is believed that the coins were buried between AD 903 and AD 910, at a time when the Ribble Valley was an important Viking route between the Irish Sea and York (Kenyon 1991). Not surprisingly, most of the coins come from England, both official Anglo-Saxon issues (about 1000) and coins of the Danelaw (about 5000). However, the hoard also contained about 1000 Carolingian coins, a handful of early Scandinavian coins, about 50 Kufic dirhams from the Islamic world, a few imitations of Kufic coins from eastern Europe, and a single Byzantine coin (Archibald 1992). The local coinage of Viking Northumbria, the largest single group in the hoard, shows some variation of wear, but all the coins were relatively new. This suggests that these issues were circulating locally, and that the hoard was buried only a few years after this coinage was first minted (Archibald 1992; Williams and Leslie 2001).
- 2.5.10 The hoard was so great a treasure that it almost certainly belonged to a person of importance, perhaps a Norse leader or king (Edwards 1998). The size of the hoard has also led to a belief that this may have been a war chest, belonging to Irish-Norse exiles intending to reoccupy Dublin from the Ribble Estuary, though there have naturally been many other theories regarding its ownership and purpose (Graham-Campbell 1992).
- 2.5.11 The location of the hoard is potentially significant being on a communication route between the Viking centre at York and Ireland, specifically the Viking kingdom of Dublin. Preston has been suggested as being the most likely harbour for an Irish-Norse fleet, again based on the assertion that the Ribble Valley provided a route to York (Graham-Campbell 1995). Given this potential importance of the Ribble estuary, weight may be added to the suggestion that the motte at Penwortham, which overlooks the Ribble to the west of Preston, may

have had pre-Conquest origins (Morgan 1978). Indeed, Higham (2004) has suggested that this may have been founded as a burh by Edward the Elder in the early tenth century.

2.6 MEDIEVAL ARCHAEOLOGY

- 2.6.1 It was during the later medieval period that the landscape that we know today was largely formed. The pattern of villages, with their irregular radial field systems, the scattered market towns and the country road system had its origins largely in this period. The impetus for the nucleation of settlement was the intensification of lordship and manorialisation in the ninth and tenth centuries (R Newman 1996a). However, this process was impeded in the North West by the unstable political situation created by the expanding kingdoms of England and Scotland (Winchester 1987, 5) during the eleventh century. During the twelfth century, as the Norman rulers expanded their power up to the present Scottish border, a significant grouping of the characteristic Norman motte and bailey defensive earthworks developed along the line of the Lune, and the indications are that for a period in the later eleventh century this river may have served as a border (*ibid*). At the same time these defensive sites became centres of feudal administration and secular jurisdiction (Higham 1991a).
- 2.6.2 The Ribble Valley was the centre of an important medieval lordship, that of the de Lacys, based in Clitheroe (Fig 21; Farrer and Brownbill 1908). This lordship, and that of Lancaster, were the first Norman bulwarks created to guard against the unstable politics to the north. This is reflected in a similar line of defensive fortifications on the Ribble, to that on the Lune, with castle sites at Penwortham (HER PRN284), Tulketh at Preston (HER PRN108), Ashton on Ribble in Preston (HER PRN15201), Clitheroe, seat of the de Lacys (HER PRN1101), and possibly at Scott House, off Green Moor Lane, north of Ribchester (HER PRN5897) (Fig 20). A timber and earth castle is suggested by Wood (1996) at Preston, but this has long vanished. Some of these were subsequently rebuilt in stone, such as the distinctive keep of Clitheroe, which was built around 1186 by Robert de Lacy to protect the administrative centre of his vast estates (Farrer and Brownbill 1908). Latterly, the de Lacys also held Pontefract, thereby creating a trans-Pennine powerbase.
- 2.6.3 **Towns:** in the late twelfth and thirteenth centuries, the North West began to see the development of what were to become the major towns of the region. Prior to the Norman Conquest, towns were not a feature of the landscape (White 1996, 125), and it is probable that the earliest towns were proto-urban defended sites, such as Lancaster and Penwortham (Fig 21), where the defended settlements grew into towns (Crosby 1994). Penwortham is referenced in Domesday Book (Morgan 1978), and was possibly the earliest borough in the region; however, its position caused it to fail as a major settlement, being away from the north/south Roman road, and with no access to a port (Higham 2004). It seems that Preston rapidly supplanted it as the main town of the area. Other settlements in the area mentioned in Domesday Book are Walton-le-Dale, Whalley, St Michael's on the Wyre, Poulton-le-Fylde, Kirkham, Ribchester and Ashton on Ribble (Morgan 1978; Faull and Stinson 1986).

- 2.6.4 By the mid thirteenth century, the principal boroughs of Lancashire were Lancaster, Preston, Liverpool, Manchester, Wigan and Warrington (Higham 2004). In addition to these there were other smaller towns, such as Penwortham and Clitheroe, in the Ribble Valley; the latter had developed alongside the de Lacy administrative centre of the castle, and had received its charter by the mid-thirteenth century (White 1996, 129).
- 2.6.5 **Rural Settlement:** from the twelfth century the uplands of the North West were mainly owned by the feudal lordships of Lancashire, the two largest being the honour of Lancaster and that of Clitheroe (Higham 2004). Upland settlement in the Pennines and Forest of Bowland consisted of open areas of rough grazing on moorland, which were invariably farmed by large cattle ranches known as vaccaries. Whole areas of forest land were retained and exploited by these demesne stock farms (Winchester 2006, 80), that is farms under the direct control of the lord of the manor. In the Forest of Bowland, which was a chase in the twelfth and thirteenth centuries belonging to the de Lacys, there were 15 vaccaries documented (LUAU 1997a). Most of these vaccary sites are now occupied by post-medieval farms but the original boundary lines that separated them are still in place, now defining the edges of the principal estates.
- 2.6.6 **Lowland Settlement North of the Ribble:** following the Norman take-over of Cumbria at the end of the eleventh century and early twelfth century, a period of calm encouraged nucleation of manorial settlements in the Ribble Valley. In the western, lower-lying part of the valley, the favoured sites for settlement were the well-drained drier ridges and hillocks in between the extensive marshes, and a distinct cluster of medieval settlement can be seen in the Lower Ribble, including Kirkham, Freckleton, Clifton, Penwortham (just south of the river), Longridge and Broughton (R Newman 1996a) all, for the most part, on the margins of the wetter lands.
- 2.6.7 **Lowland settlement south of the Ribble:** the area immediately south of the Ribble estuary still retains evidence of north/south orientated medieval strip field systems, which are highly visible even in the modern enclosure systems. Despite modern agricultural activity removing much of the ridge and furrow, the shape of the fields shows the earlier origins of the present landscape. These field systems can be seen at Longton, Hutton, Little Hoole and Much Hoole, of which Longton is cited as an exemplar of open-field agriculture and settlement in Lancashire (Fig 22; Higham 2004).
- 2.6.8 **Monastic Influence:** the study area is well endowed with monastic houses, with two major Cistercian monasteries in the Ribble Valley, at Whalley and Sawley, founded in 1147 and 1296 respectively (Farrer and Brownbill 1908).
- 2.6.9 **Whalley Abbey** (Fig 23): at Whalley there are six cross fragments in the parish churchyard, which indicate a pre-Conquest Christian community (Edwards 1978; 1990). However, the Cistercian abbey at Whalley was not founded until AD 1296. Roger, Baron Halton, the son of the founder of the abbey, inherited the land and dignities of his kinsman, Robert de Lacy. The de Lacys were one of the powerful families that had arrived at the Conquest and had been given large tracts of land in East Lancashire and West Yorkshire. It was through this connection that the monks of Stanlow acquired properties in Lancashire (Farrer and Brownbill 1908). Repeated flooding at Stanlow and other natural afflictions made the monks want to move, and a suitable site was found at Whalley.

Initially, they moved into the old rectory, pending the building of the great church, but as a result of various difficulties it was not until 1340 that serious work began, and the abbey church was eventually completed in 1388 (Wood 1996).

- 2.6.10 The last Abbot of Whalley, John Paslew, rebuilt the Abbot's lodgings and added a lady chapel, although the latter has not been located (LUAU 1991a; 1991b). Paslew was cited as having been involved in the Pilgrimage of Grace, in 1536, which was against the ecclesiastical policy of Henry VIII, and a reaction to the dissolution of the monasteries. For this he, and some of his monks, were tried on a charge of treason, and Paslew was found guilty and executed in 1537. At the time the abbey was deconsecrated and the monks dispersed (Wood 1996; Farrer and Brownbill 1908). The abbey was then treated as though it was Paslew's personal estate and was sequestered by the Crown. It was stripped of its valuables, including the lead from the roof, and committed to John Bradyll, whom the Crown appointed bailiff in 1539 (*ibid*). Later, in 1553, he and Richard Assheton jointly purchased the abbey lands, with Assheton taking the monastic buildings, in whose family they remained until 1836.
- 2.6.11 *Sawley Abbey* (Fig 24): the Abbot Benedict, twelve Cistercian monks and ten lay brothers from Newminster Abbey in Northumberland, founded Sawley in 1147. There was a slow development of the site over the next three decades; initially, a wooden building was provided by William de Percy. Building in stone commenced in the 1150s and although few documentary records survive, there was architectural evidence of new work in the late 1300s (Heritage Trust for the North West 1997).
- 2.6.12 Following this initial growth, the community fell upon hard times, and struggled to survive off the land, because of a combination of poor drainage and wet climate. The leaders considered abandoning the site around 1200 (Hunt 2005) and the head of the Cistercians, the Abbot of Clairvaux, recommended that it be dissolved or moved. However, a further grant of land from the Percy family ensured survival and then in 1296 the monks of Stanlow in Cheshire moved to Whalley and were given the tithes from Whalley church. It was unusual for two abbeys to be as close as Sawley and Whalley, being only 11km apart, and this move led to friction and competition for resources.
- 2.6.13 In the early fourteenth century Scottish raids penetrated this far south and some of the buildings were destroyed and animals were stolen. There were supporting grants made to keep the abbey stable during this period and the community survived and continued through the fourteenth century, and re-modelled the abbey in the process (Hunt 2005), which was completed by the end of the century.
- 2.6.14 Sawley Abbey was suppressed in 1536, but the final days were as harshly dealt with as the buildings themselves. Following the Dissolution, monks returned to Sawley Abbey under a new abbot. However, when Henry VIII heard of this, he immediately ordered the monks to be executed for treason, as was common practice during the Pilgrimage of Grace. Therefore, in March 1537 the abbey was again dissolved. It was stripped of all its valuable materials and left to crumble, quickly falling into a state of disrepair. In the nineteenth century, the site was cleared, with a wall built to encircle the ruins, and the site became an early visitor attraction (Hadley 1997).

- 2.6.15 Fragments of the service buildings were found elsewhere in the village and surrounding fields, as well as the monastic precinct wall and the abbey fishponds within it (Heritage Trust for the North West 1997). The fields to the east of the ruins contain very pronounced earthworks that indicate the mixed nature of the economy; an extensive earthwork survey undertaken by English Heritage shows clearly areas of cultivation preserved as ridge and furrow, field boundary ditches and enclosures, as well as drainage systems and ponds (Hunt 2005).
- 2.6.16 The Friary site at Preston has now vanished (LUAU 1991), and an early Savignac site at Tulketh was transferred in 1127 to Furness Abbey (Wood 1996). The influence of a monastic house on the landscape can be considerable and, given the presence of such a number within the valley, it is likely that there was some significant effect on agricultural practices. The need to feed the monks and the lay brothers, coupled with the relative wealth of the monasteries, meant that they could and did acquire substantial tracts of land, establishing vaccaries or granges in the hill country or on lowland waste (Winchester 1987, 6). The effect was to reclaim substantial expanses of empty land. Significant holdings were granted in the Forest of Bowland by the de Lacys to Kirkstall Abbey, Leeds. These included Rishton Grange in c1190, which is now under Stocks Reservoir (Greenwood and Bolton 1955, 15; Shaw 1956, 219; LUAU 1997a), and a surrounding area which became known as Dalehead.
- 2.6.17 **Medieval Rural Industry:** within the medieval field systems, early rural industrial evidence can be found. Notable within the Ribble Valley are retting ponds and pits that were used to soak bundles of flax in slow-moving water, which was part of the early linen industry; this substantially increased in Lancashire in later periods. One of the best known in the Ribble Valley is a series of flax ponds, sluices and channels at Grindleton, on the Ribble, north of Clitheroe (Higham 1991b; Fig 25), which survive as earthworks in the fields. A second comparable system is found just outside the study area at Newton in Bowland (*ibid*).

2.7 POST-MEDIEVAL ARCHAEOLOGY OF THE RIBBLE VALLEY

- 2.7.1 **The Rural Landscape:** the Lower Ribble Valley study area contains 835 records assigned to the post-medieval period, of which the majority are either agricultural or domestic features, which reflect the agricultural economy of the area. post-medieval farming, to a substantial extent, reflected a continuation of medieval practices. However, there were several very significant changes, particularly the collapse of the peasant farming system. During the latter part of the medieval and the earlier post-medieval periods, the peasant farmers were acquiring the land they farmed (Taylor 1983). There was a corresponding break-up of the open fields around nucleated settlements, enclosing the aratral strip fields, their shape reflecting the oxen-ploughed ridge and furrow of the open fields, typified by the fields around Longton. There was also, during the later medieval and post-medieval periods, pressure to exploit lands that had previously been waste, and there was an increase of dispersed settlement on the outlying lands.
- 2.7.2 The ultimate expression of this practice was the parliamentary enclosure movement of the eighteenth- and early nineteenth-centuries, which resulted in

considerable expansion onto the waste lands and a corresponding increase in the number of dispersed farms to exploit the newly won land-holdings (Whyte 2003). The effect of these changes was the expansion of the field systems, often with the characteristic straight lines of the parliamentary enclosures, the rationalisation of nucleated settlements, and the loss of the former waste, be it woodland or moorland.

- 2.7.3 **Industry:** the villages and towns owe their growth to the expansion of eighteenth- and nineteenth- century industry; indeed, it was the growth and spread of industry which characterised the broader economic growth of the North West. Yet the Ribble Valley, at first glance, would appear to be an unchanged landscape, dominated by pastoral farming and seemingly less affected by the ravages of industry than those in the south of the county (Rothwell 1990). However, the evidence does nevertheless demonstrate a large number and variety of industrial sites which formally existed throughout the valley.
- 2.7.4 Chatburn, West Bradford and Grindleton, for example, are villages which developed around weaving mills (Rothwell 1990; Fig 26), although it is known that earlier industries existed, such as the Grindleton and Bolton by Bowland flax growing and processing sites (Higham 1991b). It is also known that fulling mills were in operation through the area during the fifteenth to eighteenth centuries, clearly indicating the importance of the woollen industry before the nineteenth century (Rothwell 1990). Extraction industries existed also, but were mainly confined to stone quarrying and intermittent phases of lead mining in the limestone areas, which can be traced to the earlier post-medieval period, as can certain metal-working traditions (Crosby 1998). In addition to this, sandstone was quarried on Waddington and Longridge Fells, forming a primary source of building material for the Ribble area; the gritstones were also used for shaping into millstones (Mitchell 2004).
- 2.7.5 Lancashire's cotton industry rose to world dominance during the late eighteenth century (Fletcher 1996), and the Ribble Valley featured strongly during the early development of this industry. The evidence suggests that the eighteenth-century expansion was financed by merchants from outside the district who saw the potential available in the natural resources of water power and the abundance of corn mills, which could be quickly converted (Rothwell 1990). Examples of these conversions can be seen at Chatburn Mill, where the fourteenth-century corn mill had been converted to a cotton spinning mill by the early nineteenth century and renamed 'Kingsmill'. This pattern can also be seen at other sites throughout the valley.
- 2.7.6 The earliest forms of mechanisation introduced to the cotton and linen industries were carding and jenny workshops. These required little in the way of capital investment and were capable of being powered by the smaller streams of the district, which made them capable of being started by local farmers and clothiers (Rothwell 1990). Then, during the later eighteenth century, the beginnings of large-scale mechanisation began with the introduction of the Arkwright spinning mills (*ibid*).
- 2.7.7 With the beginning of the nineteenth century came the shift towards steam-powered manufacture. These were not limited by the need for fast-flowing streams, and instead their locations were influenced by the introduction of new

and better roads, canals and ultimately railways. This meant that a wider choice of settings became available for the new steam-powered mills, including the outskirts of many smaller towns, which came with a ready-made workforce. While some of this new industry found its way into the Ribble Valley, much of it was concentrated in the growing industrial towns to the south. The main period for mill building in the Ribble Valley was between 1850 and 1865, when 24 mills were constructed, mainly around Clitheroe and Longridge. The later nineteenth century saw a gradual decline in the spinning industry. The last mill to be built was the Jubilee Mill at Clitheroe, in 1891-2 (Rothwell 1990).

- 2.7.8 The burgeoning cement and limestone industries which emerged after 1850 were able to use the railway and roads to export their products and the focus of employment began to shift in the area (Rothwell 1990). The Bold Venture Limeworks near Clitheroe (Fig 26) was the largest in a local industry that had been quarrying limestone for over 400 years, both for building stone and to burn for agricultural use. Clitheroe's old lime banks are marked on the first edition OS mapping (Fig 27) and the area is riddled with workings, which include Salthill, Pimlico, Horrocksford, Coplow and Bellman Park. The site was expanded, for the cement industry, and still exists as Chatburn Limestone Quarry (Mitchell 2004).
- 2.7.9 The effect on the landscape of the Ribble Valley of the creation of large industrial centres to the south was a partial abandonment. The inhabitants of the rural communities could traditionally find work in locally based, water-powered mills, but later there was a need for larger pools of labour on the doorsteps of the giant factories, and so people left the countryside (Fletcher 1996).