6 DISCUSSION

6.1 Introduction

The reconstruction of the local ecology of Dun Law before, during and after the period of the Roman occupation of Scotland has demonstrated that by the time of the construction of Dere Street, Dun Law was a wet environment and the natural woodland that once covered the area was already substantially denuded. The evidence suggests that this decline in tree and shrub taxa was due to both natural and anthropogenic factors. The relative lack of wood as a resource would have had an impact on the Roman army's programme of road construction. Their need for wood, at least at Dun Law, would have been frustrated by the large-scale deforestation that occurred during the Iron Age. It is speculation, however, whether the Roman engineers would have preferred greenwood branches of a similar size rather than the variable collection used at Dun Law.

6.2 Palaeoenvironmental evidence

The palaeoenvironmental evidence demonstrates that during the period 4690–820 Cal BC the ecology of Dun Law was relatively dry and covered with a mature mixed forest of Alder, Hazel and Oak. However, during this timeframe evidence of woodland disturbance is first seen. This principally takes the form of a decline in Elm. The Elm decline is a European phenomenon and has been argued to be a result of human impact, natural factors or a combination of both (Parker et al 2002). The Elm decline on Dun Law was a staggered event first appearing in the record at *c* 4600 ^{14}C yrs BP. Similarly at 4000 ^{14}C yrs BP a decline in the population of Pine was also recorded. There was no clear evidence for a climatic or natural cause for the decline in these species. Although there were no palaeoenvironmental indicators of widespread ground disturbance, indicative of agricultural practices, there was a single cereal pollen grain recovered which may have derived either from a local agricultural community or from the food supplies of the Roman legions.

At 2700–2000 ^{14}C yrs BP there is evidence of large-scale forest decline, with an increase in herbaceous taxa indicative of ground disturbance. Coupled with this is the appearance of weed species and a decline in woodland species which is probably associated with agriculture. This period represents the transition from the Bronze to the Iron Age and is associated with population growth as a result of the introduction of new farming techniques and crops. This in turn may have led to increased competition for resources and the use of more marginal land, such as Dun Law.

The soil micromorphological analysis indicates that by the time the Romans constructed Dere Street, the conditions on Dun Law had become wet and boggy. The analysis shows that sand deposit 112 is the result of the weathering of either bedrock or till, and that, as this deposit was sealed by peat layer 114, the weathering was unlikely to be an in situ event, but rather the result of a localised and powerful fluvial deposition perhaps caused by heavy rain or a flash flood, the effects of which were compounded by the lack of tree cover, resulting in increased erosion. The boundary between layers 112 and 114 was sharp and defined, which also supports the hypothesis of a rapid change in the depositional environment. Thereafter the gradual accumulation of the peat occurred in a damp, and probably periodically water-filled, hollow. However, the presence of soil biota within the deposit indicates that it could not have been continuously waterlogged.

The wood that was used to construct the lattice and brushwood mat appears to have come from an unmanaged resource, and consisted of both greenwood and deadwood. The presence of possible cordage made from Sedge or rushes found within the matrix of the branchwood layer of the road suggests that the wood was bundled up and tied, presumably for ease of transport. Where the wood was transported from and by whom cannot be determined from the excavated evidence. The wood may have derived, scavenged, from the largely denuded Dun Law or from another source and transported to the top of the hill. However, since the environmental conditions of wet and boggy ground were probably not novel conditions for the Roman army, their logistical response may have been well developed by the time Agricola marched on Scotland, and is perhaps expressed as their adaptability in use of available resources, even if these resources were poor.

6.3 Roman road construction

Although excavated sections of Roman roads all conform to an overall pattern, as suggested by Marcus Vitruvius Pollio, a Roman architect and engineer (90–20 BC), the design was dependent on the subsoil, the local terrain and the available materials; the material used in road construction was, in general, locally sourced (Berechman 2003, 463). Dere Street at Dun Law amply demonstrates the use of local materials.

Where drainage was a consideration, the road surfaces were built upon an embankment (*agger*).

This could be a simple earthen bank or a more complicated construction formed from layers of differing material. Aggers can vary greatly in size, reaching 1.5m high by 15m wide (Margary 1973). At Dun Law the *agger* can be seen on either side of the excavation as an earthen embankment, but within the excavation the raised embankment is missing, presumably never being constructed across the palaeochannel, and instead a lighter road surface supported on a wooden bridging construction was adopted. Other excavated sections of Dere Street do indicate that the road was built using successive layers of material. On the north-west slope of Turf Law, north of Channelkirk, the road was found to be 8.2m wide by 0.2m thick (Willy & Gilbert 1964), and was similar to the dimensions recorded on Dun Law (7.6m wide by 0.5m deep). A deposit of clay 0.07m thick was found under the road deposits, of similar type and stratigraphic position to the deposit (104) found at Dun Law (0.11m thick). These clay deposits are interpreted here as the remnants of the *pavimentum* (the first layer on top of the *agger*). At Turf Law a single stone interpreted as a central rib was found, and a group of stones found on the downhill side was interpreted as eroded kerbing, again indicative of eroded layers of road. On the west flank of Dun Law excavations revealed a metalled surface 8.4m wide by 0.35m deep, which overlay a sandy gravel (Willy & Gilbert 1964), interpreted here as the *rudus* (the Base II or mid-layer within the basal layer), which in turn overlay what was described as a coarse bottoming, and here interpreted as the *statumen* (the Base I layer above the *pavimentum*).

The Roman army's solution for bridging small watercourses and bogs was probably already tried and tested by the time they constructed Dere Street. At Ambleside in Cumbria, the Roman Fort, the extramural settlement and an associated length of road were built upon waterlogged ground (Drury & Dunwell 2004). Evidence from excavation showed that a section of road had as its foundation layer a deposit of woodchips, small roundwood and bark fragments which had been compacted to a layer 0.04m thick. Above this a 0.02m thick mat of bracken stalks had been laid. Five wooden stakes (0.2m to 0.4m long) had been driven through these organic layers and into the subsoil, followed by a subsequent sealing layer of bracken stalks. Laid on top of this organic matting was a continuous layer of silty clay which the excavators interpreted as a foundation/levelling layer for the road, and corresponds with the *pavimentum* layer on the Dere Street excavation. Other elements that were present at Ambleside probably represent some of the courses that formed the *agger*. Later phases of the road's construction included a metalled surface and a later cobbled surface (*summacrusta* or the paving of the road).

Mertens (1955, 39) has also described how Roman engineers constructed wooden frameworks as causeways to span areas of marshy ground. Two rows of unconnected cross-beams were placed on the marshy soil for the whole length of the road. Each beam was 2m from the next one and there was a gap between the rows. Each beam came out 40cm from the road and this projection had slots to pound stakes through the beam into the ground. These beams supported two continuous rows of joists, on top of which were laid a solid series of tree trunks. On top of the tree trunks were large, flat limestone flags, covered by road material of gravel and pebbles. An example of this technique can be found on the Via Mansuerisca, where the road crossed the Hautes-Fagnes marshes in France (Adam 1994). Although the wooden foundation components at Dere Street and at Ambleside are not nearly as substantial as those found on the Via Mansuerisca, they attest to the Roman engineers' ability to bridge waterlogged ground with the use of wood. Clearly the wooden causeway at Via Mansuerisca was substantial enough to take the weight of limestone flags and a metalled surface, but was this the case for Dere Street? As only two of the expected upper layers have been identified during excavation (*pavimentum* and *statumen*), it is unknown whether this was the intended final product in order to make the road lighter and less liable to sink, or whether the putative upper courses of the road had eroded away. Evidence from Ambleside, also described as marshy ground (Drury & Dunwell 2004), suggests that the compacted mat of wood chips and bracken secured to a possible wooden framework provided enough stability and strength for the successive layers of the *agger* and metalled road surface. The areas of eroded material at the side of the road suggest that more layers were originally present at Dun Law too.

6.4 Post-Roman road use

Evidence at Dun Law suggests that even after the upper surfaces of the original Roman road had been lost through erosion, the remaining metalling was patched and repaired on several occasions, presumably to reduce the potholes which may have formed through general wear and tear and winter weather. This may have started in the Roman period, but the loss of the road surface suggests it continued beyond this.

Dere Street was in continued use in the post-Roman period, and there are numerous references throughout the medieval period attesting to the longevity of the road. References to what is thought to be Dere Street appear in a number of medieval histories and charters, one of the earliest of which is *The History of St Cuthbert* (part of the corpus of work by Simeon of Durham 1104–8; Curle 1911, 9). Simeon of Durham tells how the Bishop of Ecgred built a church at Gregnford (modern Gainford-on-Tees). This church was given to St Cuthbert, including the land in its vicinity between the Tees and Weir and the way which was known as Deorestrete, a north-to-south route through the county of Durham.

Charters issued during the reign of William the Lion (1165–1214) also make reference to Dere Street. The Chartulary of Melrose includes a charter by William of Hunum in which Melrose Monastery was granted lands that stretched from 'the stream of Cuithenhope up that whole path as far as the bank between Raweshawe and Cuithbrithishope, and so following the boundary between me and Richard de Umfraville to Derestreth on the west, and from Derestreth descending to the boundary of Chattou, and so by that boundary between me and Chattou to the stream of Cuithenhope' (Curle 1911, 10). Similarly, in a charter by Robert Berkley, Melrose Monastery was granted lands of Mackistun (modern Maxton) which included land '… on the east side of Derestrete by the watershed of Morrig …' (Curle 1911, 11).

The 1226 charter of Alexander de Chattou, which dealt with land boundaries in Rascaw, described a land boundary 'on the east side of Derestret, going up from Calne by the sike as far as Scolceuescluch, and by the same sike going up to the cross set up with our assent, and so straight thence to the head of Seteburn, and by the said burn coming down to the burn which comes down from Thedbrichteshop, and so descending to the stream of Cuithenhope' (Curle 1911, 10).

Dere Street was also used as a medieval land boundary. In a charter dating from the reign of Alexander II, John de Nomanville grants land to Melrose Monastery and defines a portion of this land thus '… to the bank of Grenrig and by the bank towards the west of Derstret to the Royal road which runs from Annadale towards Roxburgh …' (Curle 1911, 11). Dere Street is also referenced by Robert de Londoniis (Derstredt) as a boundary to lands once again granted to Melrose Monastery (Curle 1911, 12). In a charter granting lands to the Church of St Mary at Dryburgh by Hugo de Morville (*c* 1150) and endorsed by Pope Celestine III in 1196, 'Derestredt' is referenced as an eastern boundary. In 1206 AD, Alan son of Roland of Galloway issued a charter conferring land in Ulfkelyston (modern Oxton) on the church at Kelso; again Dere Street is referenced as a boundary. The section of Dere Street connecting greater Scotland, via Edinburgh, with the ecclesiastic sites of the Borders was known as the Via Regia during the High Middle Ages, and is mentioned in a charter issued by King Alexander the II granting land to the Hospice of Soutra in 1228 which makes reference to the Via Regia crossing Soutra Hill (Curle 1911, 14).