CARLISLE NORTHERN DEVELOPMENT ROUTE, CUMBRIA

Drainage Works Specific to the Hadrian's Wall SAM. Project Design 027 (rev 001)

June 2010

NGR: NY 3725 5685

Cumbria County Council

Connect roads

Birse Civils

oa north

1 BACKGROUND

1.1 INTRODUCTION

1.1.1 This document is the project design covering drainage works within and adjacent to the area of the Hadrian's Wall Scheduled Ancient Monument (SAM no. 26110). The site is located adjacent to the River Eden, north-west of Knockupworth Farm, at NGR NY 3725 5685. The works form part of the construction scheme for a new road, the Carlisle Northern Development Route (CNDR), and are designed to mitigate the impact of the drainage on the buried remains of Hadrian's Wall and its associated features, including the Vallum, which survives as a series of low earthworks situated to the south of the line of the Wall itself. The Wall itself, together with all its associated features, has been designated as a World Heritage Site since 1987 (English Heritage 2002), and is statutorily protected as a Scheduled Ancient Monument (SAM; Scheduled Ancient Monument No 26110). The proposed work will be undertaken by Oxford Archaeology North (OA North) for Birse Civils Ltd, acting on behalf of Connect CNDR who have been employed by Cumbria County Council (CCC) to build the road. Planning consent for the road construction was granted in April 2006 (application ref. 1/04/9032), with further consent for a minor amendment to the original application being granted in November 2007 (application ref. 1/07/9020). Scheduled Monument Consent (SMC) to undertake this work was sought by Geoff Holden of CCC and was granted by the Department of Culture, Media and Sport (DCMS) in March 2003 (ref. HSD 9/2/4981); subsequently, consent for a variation to the original application was granted in April 2006. Separate Scheduled Monument Consent for the sinking of geotechnical bore holes within the Hadrian's Wall SAM was granted in March 2006 (ref. HSD 9/2/7900); consent for two variations to this application was granted in April and June 2008.

1.1.2 It should be noted that it is a prosecutable offence under the Ancient Monuments and Archaeological Areas Act 1979 to execute or permit to be executed works without authorisation within the area of a Scheduled Ancient Monument. This includes carrying out works which do not have consent, or which do not comply with the terms of consent or any conditions attached to it. Due diligence must be exercised to ensure that damage to a Scheduled Ancient Monument is avoided or prevented.

1.2 CIRCUMSTANCES OF PROJECT

1.2.1 CCC propose to construct the CNDR around the western edge of Carlisle. The route extends for 8.5km around the western and northern sides of the city, from Greymoorhill North bridge (NY 3945 5990) on the north to Newby West (NY 3731 5365) in the south, and covers an area of approximately 30ha.

1.2.2 The proposed road runs in a west-south-westerly direction from Junction 44 of the M6 motorway, following the course of existing roads and passing close to Kingstown before turning south prior to crossing the main West Coast rail line. The line of the road, which from this point will comprise new build, continues south and then south-west, crossing the River Eden to the west of

Stainton. On the south bank of the river the route intersects the line of Hadrian's Wall and an associated earthwork to the south, known as the Vallum, close to Knockupworth Cottage (NY 3710 5680), at the point where the Vallum is crossed by the now dismantled Carlisle and Silloth railway, which had itself been built on the line of the former Carlisle to Port Carlisle Canal (known as the Carlisle Navigation Canal; Ramshaw 1997). After crossing the C2042 Brough Road, the route then turns south near Cornhill, following a minor road for some of the distance to Bunkershill, where it turns south-east to join the existing A595.

1.2.3 CCC propose to let the construction of the road as a PFI Design and Build-type contract. As there are significant archaeological remains along the proposed route, including the Hadrian's Wall SAM and World Heritage Site, a brief (*Appendix 4 to Annex 14 to Part 2B of Schedule 4*; hereafter referred to as 'the brief') has been prepared by CFA Archaeology, in consultation with English Heritage and CCC's Historic Environment Service (CCCHES), setting out the archaeological requirements for the main contractor in advance and during construction works associated with building the road.

1.2.4 The brief was prepared with particular reference to the results of an archaeological field evaluation of the threatened section of the scheduled area, which was undertaken by CFA Archaeology in 2005 (CFA 2005 b) (*Section 1.4.6*). It sets out the background, scope and methodology of the required archaeological works, and forms the basis for the excavation methodologies set out in *Section 3* of this report.

1.3 GEOLOGY AND TOPOGRAPHY

1.3.1 The River Eden bisects the proposed route; north of the river, the road crosses the low-lying flood plain and river terraces immediately west of Stainton, before rising steeply towards Kingmoor House. On both sides of the river, but particularly to the south, the topography consists of relatively uniform, undulating terrain, in use today predominantly as pasture and arable fields enclosed by substantial hedgerows.

1.3.2 The underlying drift geology consists of Stanwix shales overlain by drift deposits of boulder clay; adjacent to the River Eden, these deposits are also covered with alluvium (British Geological Survey 1982). The local soils are attributed to the Wick Association, coarse well-drained brown earths, which extend westwards to Burgh-by-Sands and Kirkbampton (Countryside Commission 1998).

1.4 ARCHAEOLOGICAL BACKGROUND

1.4.1 A full Environmental Statement in support of the development was published in 2000. This clarified the significance of the sites along the development route.

1.4.2 The archaeological and historical background to the CNDR development as a whole, including a survey of previous archaeological work, is presented as part of the *Outline Archaeological Strategy* (Project Design 001; OA North 2008).

Earlier work of direct relevance to that part of the route that crosses the Hadrian's Wall SAM is summarised below.

1.4.3 An archaeological assessment of the CNDR was undertaken by OA North in 1996, in its former guise as the Lancaster University Archaeological Unit (LUAU), as part of a Stage 2 Environmental Impact Assessment (LUAU 1996); this work included a desk-based survey of available cartographic and documentary sources and a walk-over survey of the different route options. The report concluded that further field evaluation was necessary to determine the full potential of the archaeology along the route.

1.4.4 The following year a limited programme of trial trenching was undertaken at Knockupworth Farm by the former Carlisle Archaeological Unit (CAU) to determine the effect the proposed road scheme would have on Hadrian's Wall and its Vallum at the point where the route crosses the river Eden (McCarthy *et al* 1997). Excavation of 12 evaluation trenches in a field south of the projected line of the Vallum and outside the boundaries of the Hadrian's Wall SAM, found sparsely distributed archaeological features, mostly small ditches/gullies, possible post holes and depressions, which suggested low-level activity at some time in the past, perhaps associated with a complex of undated cropmarks visible from the air further up the hill to the west. With the exception of a single sherd of probable Bronze Age pottery, the features produced no dateable material. However, the evaluation included only one trench located within the area of the SAM, which proved insufficient for the purposes of evaluating the potential impact of the CNDR scheme on Hadrian's Wall and its associated features. It did, however, demonstrate that the north mound of the Vallum survived as an upstanding earthwork sealed by *c* 0.3m of modern topsoil (*op cit*, 15-16; fig 5). Although the mound was not excavated, enough was seen to demonstrate that it comprised interleaving layers of redeposited gravelly clay, turf and earth, and survived to at least 0.3m in height (*ibid*). At the north-eastern end of the trench, adjacent to the steep bluff forming the south bank of the river Eden, a dense concentration of undressed sandstone fragments was interpreted as possible tumble from the stone phase of Hadrian's Wall (*op cit,*; fig 6). It was thought likely that the remains of the Wall itself had been destroyed by river erosion at this point (*op cit*, 17-18).

1.4.5 Subsequent phases of evaluation along much of the route by CFA Archaeology in 2002-3 and 2005 initially excluded the area of the SAM (CFA 2003; 2005a), but work in the area of Knockupworth Farm revealed a significant spread of archaeological features and deposits between the presumed line of Hadrian's Wall on the north-east to the present Burgh-by-Sands road on the south-west. These were thought to relate to settlement activity of prehistoric and/or Romano-British date.

1.4.6 CFA Archaeology returned to the area of the Hadrian's Wall SAM in 2005 and excavated a further 20 evaluation trenches (CFA 2005b). The remains of the foundations for the stone phase of Hadrian's Wall were identified in four trenches (2, 4, 15 and 19), adjacent to the edge of the escarpment overlooking the river Eden. The remains of the Vallum were identified in three trenches (1, 5 and 8), with the north and south mounds being identified in Trenches 1 and 8

and the ditch in Trenches 1, 5 and 8. The remains of a possible metalled track were noted on the south-western edge of the Vallum's north mound in Trench 1 (*op cit*, 9), whilst deposits tentatively interpreted as either materials associated with the construction of the Wall, or the remains of a roadway immediately south of the Wall, were recorded in Trenches 4, 15, 18 and 19 (*op cit*, 24-5). Possible field boundary earthworks of presumed post-Roman date, together with a small number of undated cut features not obviously associated with the Wall, were also recorded.

1.4.7 The next phase of archaeological works, commencing in June 2008, was undertaken by Oxford Archaeology North immediately prior to the construction of the new road. Initially three boreholes were excavated through the Vallum ditch, all of which contained organic remains, including some wood fragments.

1.4.8 Subsequently, between November 2008 and February 2009, an open area excavation revealed the remains of the stone foundations of the stone phase of Hadrian's Wall, which appeared to be cut into the remains of the turf phase of the wall (Fig 23). The wall was sited along the edge of the river cliff above the River Eden and had partially been eroded into the river. Further south, the remains of the North Mound of the Vallum and the Vallum ditch were also revealed, the latter heavily truncated by the post-medieval railway and canal. Two trenches across the north mound deposits were carefully excavated by a tracked 360° excavator under close archaeological supervision, as was an area of the North Mound in the footprint of an underpass. The northern of the two trenches is located no further than 1.5m south of a proposed drainage trench (*Section 3.2.9*; Fig 23)

1.5 OXFORD ARCHAEOLOGY

1.5.1 Oxford Archaeology has over 30 years of experience in professional archaeology, and provides a professional and cost effective service. It is the largest employer of archaeologists in the country, with more than 200 members of staff, and can deploy considerable resources with extensive experience to deal with any archaeological obligations arising from the development. Our UK offices in Lancaster, Oxford and Cambridge, trading as Oxford Archaeology North (OA North), Oxford Archaeology (OA) and Oxford Archaeology East (OA East) respectively, enable us to provide a truly nationwide service. Watching briefs, evaluations and excavations have taken place within the planning process, to fulfil the requirements of clients and planning authorities, to very rigorous timetables. OA is an Institute of Field Archaeologists (IFA) Registered Organisation (No 17), is bound by the IFA's Code of Conduct and applies the IFA's quality standards.

1.5.2 Between our three UK offices our company has unrivalled experience of working on prehistoric, Roman, medieval and post-medieval sites, and is recognised as one of the leading archaeological units in the country.

2 AIMS AND OBJECTIVES

2.1 ACADEMIC AIMS

2.1.1 The main research aim of the archaeological work will be to fully record and interpret the extent, nature, quality and significance of any archaeological deposits, and in particular those relating to the Hadrian's Wall SAM, that lie within areas which will be affected by construction of the drains and associated activities. OA North will also monitor and advise the construction team, to ensure that their works do not infringe the condition of the Scheduled Monument Consent.

2.1.2 The principal research themes for the proposed archaeological works within and adjacent to the area of the Hadrian's Wall SAM have been defined with specific reference to the recently completed Archaeological Research Framework for North West England, and the current draft of the developing Hadrian's Wall Research Framework. These important initiatives each comprise a Resource Assessment (Brennand 2006; Symonds in prep a), which summarises the current state of archaeological knowledge and describes the nature of the archaeological resource, and a Research Agenda and Strategy (Brennand 2007; Symonds in prep b; c), which seek to identify gaps in current knowledge, to assess the potential of the resource to address these lacunae, and to formulate research initiatives. OA North personnel have been actively involved in the preparation of both documents, and have provided major contributions to several of the period-specific Resource Assessments and Research Agendas.

2.1.3 ***Prehistoric***: the possibility that remains of pre-Roman human activity may be present within the proposed area of works on the Hadrian's Wall SAM cannot be completely discounted. In view of the paucity of evidence for late upper palaeolithic (*c* 11 000-8000 BC) and mesolithic (*c* 8000-4000 BC) activity in the area it is highly unlikely that remains relating to these periods will be found. However, the possibility cannot be completely ruled out, at least in the case of mesolithic evidence, since flintwork of this period has turned up unexpectedly during excavations elsewhere in the region, including central Carlisle (Caruana and Cherry 1994; Tolan-Smith in prep) and at Brampton (Zant 1998, 298). If material of this period were to be encountered it would potentially be of regional significance. In this case, characterisation of the resource and, if circumstances are favourable, scientific (absolute) dating, would be important research priorities, as the North West regional Research agenda makes clear (Hodgson and Brennand 2007, 36-8).

2.1.4 Unequivocal evidence for neolithic, Bronze Age and Iron Age settlement in the vicinity of the CNDR site is extremely sparse, and is completely absent from within the study area of the Hadrian's Wall SAM. However, despite the current lack of evidence it would be unwise to rule out the possibility that the remains of later prehistoric activity survives within the study area, since river terraces of the kind traversed by the proposed road in the vicinity of the river Eden were frequently favoured for settlement in prehistory on account of the presence of fertile and well-drained alluvial soils (Evans 1975, 62).

2.1.5 Furthermore, there are indications from elsewhere on the CNDR route that some parts at least of the development site were occupied in prehistory. The evaluation undertaken by the former Carlisle Archaeological Unit (CAU) north of Knockupworth cottage in 1997 (McCarthy *et al* 1997a, 12, 15) recovered a sherd of Bronze Age pottery and evidence for putative field boundary/enclosure ditches of possible prehistoric or Romano-British date, whilst a lithic scatter was recovered from modern topsoil during the evaluation undertaken by CFA immediately north of the Eden (CFA 2005a). Perhaps more significantly, aerial photography of the line of the road west and north of Stainton, again north of the river Eden, has revealed a complex of rectilinear and curvilinear crop-marks, including a number of apparently circular and semi-circular features that are most probably prehistoric. The precise significance of the linear and rectilinear features is not known; some have the appearance of rectangular ditched enclosures, whilst others may be the remains of trackways and field systems. Such remains would not be out of place in a late prehistoric (Bronze Age/Iron Age) or Romano-British context, and are likely to have been associated with a small rural settlement or farmstead. The unravelling of pre-Roman landscape stratigraphies such as these is identified as an important research objective in the draft Research Strategy for Hadrian's Wall (Symonds in prep c), whilst the recognition of Iron Age activity would contribute greatly to an understanding of late prehistoric settlement, land-use and economy in the region, and might advance understanding of the impact on the native population of the arrival of the Roman army (Symonds in prep b).

2.1.6 As with the earlier prehistoric periods, the discovery of neolithic, Bronze Age or Iron Age remains within the excavated area of the Hadrian's Wall SAM would be of considerable regional importance, as both the North West regional Research Agenda and the draft Research Agenda for Hadrian's Wall acknowledge (Hodgson and Brennand 2007, 39-50; Symonds in prep b). Dating and characterisation of any such remains can be regarded as a major research aim (Symonds in prep c), and is only achievable through detailed excavation and recording, the recovery of artefacts and ecofacts and (as the North West regional Research Agenda stresses), the application of a full range of scientific techniques (Hodgson and Brennand 2007, 51), including a programme of sampling for palaeoenvironmental evidence and for material suitable for scientific (absolute) dating.

2.1.7 ***Roman***: the archaeology of the Roman period within the study area is inevitably dominated by Hadrian's Wall and its associated features. However, by the time the Wall was built in the AD 120s, the Tyne-Solway isthmus had already seen a great deal of Roman military activity in the 50 years since the initial penetration of the region by the Roman army in the early AD 70s. It is also becoming increasingly clear that the region was home to a considerable indigenous population who continued to occupy and farm the land much as their forebears had done for centuries prior to the arrival of the Romans (Breeze 2006, 52). Some potential therefore exists within the study area for the survival of Roman-period remains pre-dating Hadrian's Wall, be they elements of the pre-Hadrianic military infrastructure or of 'native' settlement patterns. There is also potential for studying the impact of Hadrian's Wall on

the pre-existing landscape, and in particular the effect its construction had on earlier patterns of settlement and land-use, and on the local environment.

2.1.8 The research aims for the Romano-British period within the area of the Hadrian's Wall SAM affected by the CNDR project can be sub-divided into three main thematic sections: i) indigenous settlement and land-use, including the impact on the resident population (and on the landscape) of Roman military activity (particularly the construction of Hadrian's Wall); ii) pre-Hadrianic military developments, including the putative 'western Stanegate'; iii) the construction, occupation, and developmental history of the Hadrian's Wall frontier system.

2.1.9 With reference to 'native' settlement during the Romano-British period, the Research Agenda for North West England highlights the urgent need for the location and excavation of potential Romano-British rural sites in the region, and for the consideration of rural sites within their landscape context (Philpott and Brennand 2007, 66). The draft Resource Assessment for Hadrian's Wall (Symonds in prep a) also points to the need to redress the balance of research in the Wall zone, where indigenous settlement patterns have often been viewed negatively, as the backdrop to the 'more important' Roman military activity (Hingley in prep; Huntley in prep; Symonds in prep d). The historical bias towards the recovery of artefactual and environmental assemblages, including faunal material, from military sites and *vici* is also acknowledged in the draft Research Agenda (Symonds in prep b), and the need to expand the datasets from native-type settlements is highlighted.

2.1.10 Research priorities for rural sites include determination of character, chronology, and economy (Philpott and Brennand 2007, 66; Symonds in prep b and c), the investigation of possible continuity of occupation between the late pre-Roman Iron Age and the Romano-British period, and the examination of the origins and development of rural settlement patterns, including questions of land management (*ibid*). With specific reference to the study area, the possible impact of the Roman army in both the pre-Hadrianic period and subsequent to the construction of Hadrian's Wall, on pre-existing patterns of settlement and land-use, must be regarded as a research priority.

2.1.11 With reference to the military situation on the Tyne-Solway isthmus in the years prior to the construction of Hadrian's Wall, the draft Research Agenda and Research Strategy for Hadrian's Wall (Symonds in prep b and c) identify a number of research priorities, some of which could potentially be addressed by the proposed works within the Hadrian's Wall SAM, subject to the occurrence and/or survival of relevant features and deposits in the study area. These include ascertaining the course of the putative 'western Stanegate' road west of Carlisle; identifying and characterising any pre-Hadrianic military installations, such as watchtowers, that may be related to the 'western Stanegate' system; and clarification of the relationship between the Stanegate installations and pre-existing settlement patterns, including the impact of pre-Hadrianic military activity on the indigenous population.

2.1.12 Although Hadrian's Wall itself is one of the most studied Roman frontiers in the Roman Empire (Hodgson 1997, 62), many important research questions relating to its character and development remain unresolved. Consequently, the draft Research Agenda and Research Strategy for Hadrian's Wall (Symonds in prep b and c) set out a large number of research aims to enhance understanding of the character and development of the Hadrianic frontier system. Those that could potentially be addressed by the proposed archaeological works on the Hadrian's Wall SAM within the CNDR corridor are summarised below:

- there is an urgent need for further data gathering on all aspects of the Hadrian's Wall frontier, especially from the comparatively unresearched western sector. Work to precisely locate the position of all the installations in this area, including the Turf Wall and Military Way, which are entirely unknown within the study area, and the Vallum, which is imperfectly known, is urgently required. Detailed investigations are also needed to elucidate the structural and chronological development of these features, and of the Stone Wall itself, and to assess their present condition. Evaluation of the Hadrian's Wall SAM within the CNDR corridor (CFA 2005b) produced only seven sherds of Roman pottery (*op cit*, 22). However, excavation of Roman levels was extremely limited, and at least four of the sherds came from well-stratified deposits in the Vallum ditch and the south mound, hinting at the potential of the site for the recovery of chronologically significant data;

- persuant to the above, the draft Research Strategy proposes the excavation of a complete transect across the Hadrianic frontier works (Symonds in prep c, Section 4.4). This should encompass the entire width of the frontier, and ideally sections should be excavated in both the eastern sector of the Wall and in the west, where knowledge of the Wall structures is currently most limited. The CNDR project offers an unique opportunity to undertake the controlled excavation of just such a transect across a little researched section of the western frontier;

- there is a need to refine the chronology of the replacement of the Turf Wall in stone, which is currently unclear due to unsatisfactory dating evidence;

- sourcing of the lime used in the core of the Intermediate Wall, which was mortared rather than clay-bonded (Symonds in prep b and c), has not been the subject of previous research. The Stone Wall appears to be very poorly preserved within the study area, where only its basal (foundation) course was found to have survived during the 2005 evaluation (CFA 2005b). The evaluation report makes no mention of mortar within the Wall core (*ibid*), but it is possible that sufficient may remain elsewhere within the development area for this to be addressed;

- much uncertainty remains concerning the character, development, and function of the Vallum (Heywood 1965, 94; Wilmott in prep b). In

addition to these more general issues, specific questions that could potentially be addressed by the proposed works (*ibid*; Symonds in prep b) include the composition of the marginal mound and its relationship with later crossings; the nature and sequence of ditch filling; the purpose of the intermittent patches of metalling on the Vallum berm (CFA 2005b); the possible preservation of evidence for pre-Roman land-use beneath the Vallum mounds, including buried soil profiles; and paleoecological studies of pollen and other environmental materials that may survive in the Vallum ditch and mounds and in any levels sealed by the mounds. Potentially waterlogged deposits were noted in the ditch during the 2005 evaluation, and turf was recorded in the mounds (CFA 2005b). Waterlogged material was certainly present in the lower levels of a geotechnical core that was recently extracted from the ditch fills (E Huckerby *pers comm*).

- it is noteworthy that within the study area the river Eden appears to have followed a relatively dynamic course, now looping to the north between Milecastles 66 and 67, before sweeping south again between Milecastles 67 and 68. In both areas, the flat land to the south and north respectively is clearly maintained by flood defences and could well mask a somewhat different course during the Roman period. A study of the fluvial history of the Eden at the point the CNDR crosses the river would be of considerable relevance to an understanding of the positioning of the Wall in this area and would supplement that already undertaken on behalf of Cumbria County Council in the vicinity of the fort at Carlisle (OA North 2004). Any potential to augment this with a programme of closely dated palaeoenvironmental study would also be of great benefit to an understanding of the history and development of the local environment and would add to that already undertaken as part of the North West Wetlands Survey (Hodgkinson *et al* 2000);

- in the transitional period from late Roman to early medieval traditions, little research have been carried out on the Wall into the question of whether post-Roman activity was confined to the forts, or if other elements of the frontier system also continued in use (Symonds in prep b). It is conceivable that evidence pertinent to this area of research might survive within the study area, although no known structures that might have seen late occupation, such as turrets or milecastles, lie within the CNDR route.

2.1.13 ***Post-Roman***: the nature of settlement in the region during the earlier post-Roman period is difficult to determine. As with the pre-Roman Iron Age in the area, this is due in large part to the relative invisibility of this period in the archaeological record (in comparison with the Roman period), resulting from a relative paucity of datable artefacts and obvious field monuments. However, it is important that the possibility of the survival of early post-Roman remains within the study area be recognised and taken into account (Symonds in prep c), and that any evidence relating to early medieval activity should be recognised and characterised at an early stage, and all possible attempts be made to procure absolute dating (*ibid*, 114; Newman and Brennand 2007, 76).

Sampling and analysis of suitable deposits for palaeoenvironmental evidence of clearance or reforestation, and changes in agricultural practice during the period of transition between the Roman and immediately post-Roman periods will be especially important (*op cit*, 83), as study of this potentially highly significant source of evidence has only just begun with reference to the early medieval period in the area (Symonds in prep e). The investigation of any such remains has the potential to address a major gap in present knowledge (highlighted by the draft Research Agenda for Hadrian's Wall) relating to the transition from late Roman to recognisably post-Roman traditions in the Hadrian's Wall zone..

2.1.14 There is little, if any, evidence for medieval activity within the study area, although a sandstone cross on the line of Hadrian's Wall on Davidson's Banks, east of the CNDR route (Royal Commission on Historic Monuments (England) 1996) may well be of this time, as preaching crosses and other crosses of uncertain purpose are a feature of the medieval period in the region (Newman 2006, 132). Similarly, the undated, but seemingly post-Roman, field banks found during the 2005 evaluation (CFA 2005b) could conceivably relate to medieval land-use, although they are perhaps more likely to be of post-medieval date. Evidence from the CNDR corridor as a whole suggests that surviving field boundaries pre-date the production of the OS first edition map in 1874 (LUAU 1996, 8), and could, in part at least, reflect the late medieval or early post-medieval landscape.

2.1.15 Deposits such as peat, likely to provide evidence of medieval palaeoecological activity, are likely to have been destroyed by cutting, and any small-scale localised survival is not predictable. However, sampling for palaeoenvironmental analysis of any suitable deposits that may be encountered can be regarded as a research priority for the light it may shed on development and exploitation of the landscape (Newman and Newman 2007, 101, 114), as can the excavation of any surviving features of this period, such as relict field boundaries. Indeed, the CNDR project as a whole is singled-out in the Regional Research Strategy for the North West for its potential to allow unprecedented analysis of the environmental setting of the medieval city of Carlisle (Brennand *et al* 2007, 168-9).

2.1.16 Post-medieval activity in the study area is largely confined to the existing agricultural landscape, presumably dating in large part from the main period of enclosure in the eighteenth and nineteenth centuries (McNeil and Newman 2006, 166-7). However, a post-medieval feature of particular significance that crosses the study area in the area is the Carlisle to Port Carlisle Canal (the Carlisle Navigation Canal), which was completed in 1823 (Ramshaw 1997, 17, 25) but went out use in 1853, when it was converted into a railway (the Carlisle and Silloth branch line of the North British Railway) (*op cit*, 136-7). Both the canal and the (now long disused) railway are regionally important monuments reflecting the rapid growth of Carlisle as an industrial city in the nineteenth and twentieth centuries, and are worthy of archaeological examination in their own right. Additionally, an important research objective would be to investigate what impact the construction of the canal and the railway had on the remains of the Vallum. It is normally presumed that the

Vallum was completely destroyed at the points where it was crossed by the canal and railway, but it would be useful to test this assumption by excavation.

2.1.17 ***The ancient environment***: a number of chronologically discrete palaeoecological research questions have been considered above. There is, however, a more general need to establish a wider understanding of landscape development within the study area, and the impact that human activity had on the landscape from earliest times. The theme of landscape development and the need to set human activity of whatever period within its landscape context is a fundamental one, and is a common thread that runs throughout the Resource Assessment, Research Agenda and Research Strategy for the North West (Brennand 2006; 2007; Brennand *et al* 2007), and the draft Assessment, Agenda and Strategy for Hadrian's Wall (Symonds in prep a; b; c).

2.1.18 Until recently most of the soils in Carlisle and the surrounding area were regarded as inimical to the survival of ancient pollen; however, recent analysis in the course of the Millennium Project has proved this not to be the case, at least on some sites (E Huckerby *pers comm*). An awareness of the possibility of pollen survival in certain archaeological deposits within the study area is therefore essential, and strategies for the sampling of pollen, as well as other paleoenvironmental remains, must be developed and implemented for all suitable stratigraphic deposits.

2.1.19 Both the draft Resource Assessment and Research Agenda for Hadrian's Wall (Symonds in prep a and b) draw attention to the importance of pollen and other palaeoenvironmental remains that have been recovered from buried soils sealed by features associated with Hadrian's Wall (Huntley *et al* in prep; Symonds in prep b), including the Vallum mounds. The importance of such features for the preservation of the remains of pre-Roman (or at least pre-Hadrianic) agricultural activity, including evidence for cord-rig cultivation and field boundaries, is also noted (Huntley *et al* in prep), whilst the draft Research Strategy for the Wall (Symonds in prep c) highlights the need to make provision for the survival of such deposits during the formulation of archaeological briefs and project designs. Any pollen evidence for the late Roman and early post-Roman periods is also considered to be of high significance for its potential to advance understanding of potential changes in land-use during this period of transition (Symonds in prep b). The turf incorporated into such features as the Turf Wall and the Vallum mounds, which probably came from close to hand in most cases, can also provide clues to local environmental conditions at the time of their construction (*ibid*; Symonds in prep c), as can geo-archaeological studies of the silts that accumulated in the Wall ditch and the Vallum ditch (*ibid*).

2.1.20 Whilst pollen studies are becoming increasingly commonplace on excavations in the Hadrian's Wall zone, and indeed more widely in the region, pedological studies of buried soils associated with the Wall, looking specifically at the development and character of buried soil profiles, are currently few and far between (Petts and Gerrard 2006, 9). The proposed archaeological works within the area of the Hadrians' Wall SAM during the CNDR project have clear potential to address this issue, subject to the satisfactory survival of

buried soils beneath major historical features such as the Vallum mounds and (possibly) the remains of the Turf Wall.

2.1.21 The proposed route of the new road crosses the River Eden and this must be regarded as of great potential for palaeoecological and geo-archaeological research. This is much enhanced by the proximity of Hadrian's Wall and there is potential for direct, dated links to be made between the fluvial history of the river (including possible changes in course and level) and the man-made monuments, an area of research highlighted by the draft Research Agenda for Hadrian's Wall (Symonds in prep b). To this end it is proposed that a detailed study of the deposits of the flood plain and valley be undertaken. Whilst fluvial deposits are not optimal for the establishment of a detailed palaeoecological study, well-dated high-resolution pollen analysis of deposits following a transect of the plain will add significantly to understanding of the natural context of Hadrian's Wall.

2.2 OBJECTIVES

2.2.1 Persuant to the main academic aims detailed in *Section 2.1*, the principal objectives of the archaeological work associated with the drains within the area of the SAM can be summarised as follows:

- to fully excavate a complete section across the Vallum, on the line of the proposed drainage run. This will include excavation of the Vallum ditch, the north and south mounds, and any other associated features (such as secondary crossings, the putative 'patrol track', or the marginal mound) located within the areas of excavation;

- to fully excavate any other archaeological features and deposits, of all periods and types (including any evidence for pre-Roman and post-Roman occupation or activity), that are encountered within the threatened area and on which the drain construction will have a direct physical impact.

- to fully record, by means of written descriptions, survey, scale drawings and photographs, all significant archaeological features and deposits within the threatened area;

- to recover all artefacts and ecofacts from all archaeological deposits located within the threatened area;

- to retrieve palaeoenvironmental samples, including bulk samples and column samples, as appropriate, from suitable archaeological (and natural) deposits, and to undertake pedological studies of significant buried soil horizons, should any be encountered;

- to undertake all on-site archaeological works in accordance with current Health and Safety legislation and relevant guidelines;

- to produce a client report summarising the results of the archaeological works;

- to undertake a full assessment of the results of the archaeological works, including recommendations for further analysis leading to publication;

- to undertake analysis of the archaeological data generated by the works, subject to the recommendations set out in the assessment report, and to adequately publish the results;

- to produce an archive report, and to prepare a project archive to professional standards.

2.3 POST-EXCAVATION ASSESSMENT AND ARCHIVE PRODUCTION

2.3.1 The site records and any finds and samples generated by the archaeological works will form a checked and ordered site archive as outlined in the English Heritage guideline document *Management of archaeological projects, 2nd edition* (English Heritage 1991; hereafter *MAP 2*). Documents will also be compliant with the recent English Heritage initiative *Management of research projects in the historic environment* (MoRPHE; English Heritage 2006), which will gradually replace *MAP 2* The results will form part of the archaeological post-excavation assessment undertaken for the CNDR project as a whole, which will be deposited with Cumbria County Council's Historic Environment Record (CCCHER) and English Heritage in due course.

3 METHOD STATEMENT

3.1 GENERAL

3.1.1 The following work programme is based on information available at this time and is submitted in line with the aims and objectives summarised above. The methodologies set out below are intended to address fully the requirements for archaeological works associated with the drainage within and adjacent to the Hadrian's Wall SAM (Fig 23) as described in the project brief prepared by CFA Archaeology.

3.1.2 All aspects of the fieldwork will be conducted in accordance with the IFA Code of Conduct and other relevant standards and guidance (Section 11.1 of the brief). Oxford Archaeology fully endorses the following codes of conduct issued by the IFA:

- *Code of conduct* (revised edition; IFA 2002);
- *Standard and guidance for archaeological field excavation* (revised edition; IFA 2001);
- *Code of approved practice for the regulation of contractual arrangements in field archaeology* (revised edition; IFA 2000).

3.1.3 Management of the project will be in accordance with the methods and practice described in *MAP 2* (English Heritage 1991).

3.2 FIELDWORK

3.2.1 ***Surveying***: co-ordinates will be obtained from Birse Civils recording the precise location of all areas within the SAM where there is a possibility of construction impact and where archaeological excavation may be required. This will include the drainage easement and the drainage cutting. Birse Civils or their subcontractor will be responsible for accurately locating and for clearly marking these areas. OA North will independently survey the areas with a Differentiated Global Positioning System (DGPS), and the boundaries will be tied-in to the Ordnance Survey National Grid. If OA North are not completely satisfied that the boundaries are in the correct position, they will stop the works until this is demonstrated to their satisfaction.

3.2.2 ***Excavation***: particular importance is attached to the excavation of any remains associated with the Hadrian's Wall SAM, which is also designated as a World Heritage Site. The excavation undertaken within the scheduled area by Oxford Archaeology North in 2008/9 (*Section 1.4.8*; Fig 23) demonstrated that the foundation for the stone phase of Hadrian's Wall survived in this area and the putative remains of the turf phase of the wall were also identified. The course of the wall suggests that these remains should, however, lie outside of the area of drainage impact. The 2005 evaluation by CFA (*Section 1.4.6*), and the 1997 evaluation by CAU (*Section 1.4.4*),

also showed that remains of the Vallum survived within the CNDR corridor, and will lie within the area of drainage impact. This was confirmed by the Oxford Archaeology North excavations (*Section 1.4.8*). The Vallum ditch, not being threatened by construction, was not excavated to its total depth during either the evaluation or the excavation, but three boreholes through its deposits have highlighted the potential for the survival of significant palaeoenvironmental remains (*Section 1.4.7*).

3.2.3 The site will be inspected by the supervising archaeologist prior to the commencement of machine excavation, including an examination of any available exposure. It is assumed that all issues relating to services within the area of excavation will be dealt with by the main contractor as part of their overall health and safety obligations; the main contractor will research the location of services with statutory bodies prior to the commencement of any invasive archaeological works. This information will be made available to OA North prior to the commencement of the archaeological works through a permit to dig system.

3.2.4 The topsoil will be removed across the full working easement of the drainage run, in the area defined on Figure 23, in level spits using a 360° excavator fitted with a wide, toothless ditching bucket and working under constant archaeological supervision, to the top of either the subsoil or to the archaeological horizon if no subsoil seals this. As machining progresses spoil will be transported by dumpers for storage outside the area of the Hadrian's Wall SAM, or to the area of the completed excavation (Fig 23; since storage of spoil is not permitted within the SAM area outside the boundary of the new road; in compliance with Section 2.2 of the brief).

3.2.5 Great care will have to be exercised with regard to the movement of machines across the SAM area during stripping. Where topsoil is soft, vehicles may begin to create ruts into the top of the horizon of archaeological preservation. This can cause considerable damage to archaeological remains. Weather will play an important part in the timing of stripping and in its successful completion, and constant monitoring will be required. It may be desirable to install geotextile and aggregate cushions in areas where plant movement may threaten archaeological deposits – this will be discussed with the English Heritage archaeologist.

3.2.6 Following the machine removal of the topsoil, a base plan of any identified archaeological features will be produced at an appropriate scale. Excavation of these features will proceed by hand, in stratigraphic sequence. The requirements for excavation, including definition of minimum levels of sample excavation related to feature or deposit type, are set out in the brief and a sampling strategy will be confirmed with EH. All excavation, both by machine and by hand, will be undertaken with a view to avoiding damage to any archaeological features or deposits which appear worthy of preservation *in situ*; it should be noted that any Vallum mound deposits encountered within the drainage easement (rather than the drainage runs) will be preserved *in situ* if road construction will not have a direct physical impact upon them.

3.2.7 In accordance with Sections 4.3.2 and 4.3.3 of the brief, the archaeological works will also involve the excavation of drainage trenches no greater than 0.75m wide between manholes located at points 1, 2 and 3 and points 4 and 5 on Figure 23. It is important to note that any changes to the design of the drainage works within the area of the SAM must be agreed in advance with the Hadrian's Wall Archaeologist, and may require the submission of an application for a variation to the existing Scheduled Monument Consent.

3.2.8 Between points 1 and 2, as depicted on Figure 23, further machining will be undertaken within the 0.75m wide drainage trench, following the topsoil stripping. This will comprise the removal of the material within the trench to the level of either the natural geology or any significant archaeological deposits, should these be encountered first, and will include the removal of all the North Mound material within the drainage trench. This will permit a section through the mound to be recorded, and will expose any archaeological horizons or features surviving sealed beneath the mound deposits. All archaeological features exposed by the machining will be hand-cleaned as necessary, hand-excavated and fully recorded in accordance with *Sections 3.2.14-18*.

3.2.9 In two places - between points 2 and 3, and between points 4 and 5, as shown on Figure 23, the proposed drainage trenches cut across the line of the Vallum ditch and the north and south mounds. The trench between points 2 and 3 will be, at 3m in depth, sufficiently deep to potentially provide a complete section across the Vallum, including a full profile of the Vallum ditch. That between points 4 and 5 is, however, only required to be *c* 1m deep, and will therefore provide only a partial section across the Vallum.

3.2.10 The Vallum ditch is expected to be at least 3m deep (Breeze 2006, 84-5), as such, health and safety considerations will require the drainage trench between points 2 and 3 to be stepped; the trench between points 4 and 5 will not exceed *c* 1m in depth and can therefore be excavated without a requirement for stepping. In discussions with the Hadrian's Wall Archaeologist (M Collins *pers comm*), it was agreed that all late post-medieval or modern infills encountered within the upper part of the Vallum ditch could be removed mechanically, under constant archaeological supervision, down onto the top of the latest archaeologically significant deposits. It was further agreed that late post-medieval/modern deposits could be removed over an area sufficiently wide to facilitate safe working within the deeper ditch fills. Beneath this level, probably 2m below the present ground surface, excavation of all archaeologically significant deposits will proceed by hand. In the deep drainage trench between points 2 and 3, excavation will proceed to the undisturbed natural subsoil at the base (and sides) of the Vallum ditch or to the depth of insertion of the drain, whichever is reached first. The shallow drainage trench between points 4 and 5, which is likely to contain similar archaeology to the northern of the two previously machine-excavated trenches (*Section 1.4.8*; Fig 23) will be carefully machine excavated to the finished depth of *c* 1m, utilising the previously agreed methodology. In accordance

with Section 4.3.3 of the brief, all exposed sections within the Vallum will be recorded, stratified finds will be recovered, and soils and sediments sampled as required.

3.2.11 The deep excavation across the Vallum between points 2 and 3 requires a stepped trench to be excavated to the construction impact depth of 3m, with a trench of 0.75m minimum width at the base of the excavation. All arisings from the excavation will be removed from the Scheduled Area by a mechanical dumper and stored elsewhere, or within the part of the Scheduled Area fully sterilised of archaeology in the previous phase of fieldwork.

3.2.12 Assuming a construction impact of 3m depth for the drainage run, a trench 4.75m wide would be stripped of topsoil and subsoil and further machine excavation would then proceed, removing all the modern or post-medieval fills from the upper part of the Vallum ditch stopping at the depth of archaeologically significant deposits, whence excavation will proceed by hand. Hand and machine excavation, will leave a series of steps of 1m depth and 1m width, until the drainage trench, 0.75m wide, is fully excavated at the depth of insertion of the drain, or the natural subsoil is exposed, whichever condition is fulfilled first.

3.2.13 Birse Civils will have overall responsibility for the safety of all those working within the trench; safe practise will override any archaeological concerns. Artificial lighting and de-watering may also be required (any water pumped from the trench will drain outside of the Scheduled Area). Birse Civils will be responsible for the provision of these items. Within the trench between points 2 and 3, it is Birse Civils' intention to install a length of the drainage pipe immediately after archaeological recording has been completed for a given portion of the trench. The completed portion of trench will then be backfilled to ensure that there is no unnecessary degradation of the monument. English Heritage will be informed of the anticipated schedule so that it will be possible for them to view the completed trench prior to backfilling.

3.2.14 ***Excavation recording methodology:*** in accordance with Sections 4.4 and 6.1 of the brief, a detailed record will be made of the stratigraphic sequence of the site, in accordance with IFA and English Heritage guidelines (*Section 3.1*). All on-site recording will be undertaken in accordance with the requirements of the OA Field Manual (Wilkinson 1992), a copy of which accompanies this Project Design (*Appendix 1*). An up-to-date copy of the OA Field Manual will be deposited with English Heritage and the CCCHES before the archaeological work commences, in compliance with Section 5.18 of the brief.

3.2.15 Context recording will operate a continuous unique numbering system. Written descriptions will be recorded on pro-forma sheets comprising factual data and interpretative elements (Section 6.1 of the brief). A unique alpha-numeric project code will appear on all records. A Harris matrix will be compiled during the course of the excavation (Section 4.5 of the brief).

3.2.16 In accordance with Sections 4.5, 4.8 and 6.1 of the brief, all archaeological

features and deposits will be recorded in plan and section, as appropriate. Planning will be undertaken using the 'single context' method; plans will normally be drawn at 1:20 but if complex deposits are revealed a scale of 1:10 will be used; all burials will be drawn at 1:10. The height of all principal strata and features will be recorded in metres relative to Ordnance Datum. Plans will be surveyed to the site grid and digitised to provide an overall CAD plan that can be imported to a Geographical Information System (GIS) for interpretation. A register of plans will be kept.

3.2.17 All trench faces requiring examination or recording will be hand cleaned using appropriate tools (Section 4.7 of the brief). Sections will be drawn at an appropriate scale, and will be tied in to Ordnance Datum (Section 6.1 of the brief); a register of sections will be kept.

3.2.18 In accordance with Section 6.3 of the brief, a full black and white and colour (35mm transparency) photographic record, illustrating in both detail and general context the principal features and finds discovered will be maintained. All photographs of archaeological features and deposits will include a graduated metric scale The photographic record will also include working shots to illustrate more generally the nature of the archaeological work. Digital photographs will also supplement this record. Photographs will be recorded on OA Photographic Record Sheets. A register of photographs will be kept.

3.2.19 ***Artefactual sampling strategies*:** in accordance with Sections 5.1, 5.2, and 5.14 of the brief, all finds visible during the fieldwork programme will be collected, processed, conserved (as required) and stored in accordance with current best practice as set out in the relevant guidelines issued by the IFA, English Heritage, UKIC and others (IFA nd; English Heritage 1991; UKIC 1983; 1990; Watkinson and Neal 1998). Copies of OA's Field Manual and Finds Manual are appended to this Project Design (*Appendices 1-2*). A register of small finds will be maintained.

3.2.20 Artefact assemblages will be recovered to assist in dating stratigraphic sequences and for obtaining ceramic assemblages for comparison with other sites. All artefacts will be retained from excavated contexts unless they are of recent origin. In these cases sufficient material will be retained to date and establish the function of the feature from which they came. Unstratified recent material will not be retained. Certain classes of building material or post-medieval pottery may sometimes be discarded after recording if an appropriate sample is retained. However, any such decisions would not be taken until after the post-excavation assessment is completed. All artefact collection and discard policies will be fit for the defined purpose, in compliance with Section 5.8 of the brief.

3.2.21 OA employs artefact specialists with considerable expertise in the investigation, excavation and management of sites of all periods and types, who are readily available for consultation. In cases where in-house expertise is not available, external specialist advice will be sought, as appropriate.

3.2.22 In compliance with Sections 5.2 and 5.5 of the brief, the finds assemblage will be scanned by OA North's Finds Manager, Christine Howard-Davis (see *Section 5*), to assess the chronological and typological range of the material, with particular reference to the pottery. All retained bulk finds will be washed and, with the exception of animal bones, marked, in a manner that is indelible and irremovable by abrasion, in accordance with Section 5.3 of the brief. Bulk finds will be appropriately bagged and boxed and box lists of material will be compiled. This will be carried out no later than two months after the end of the excavation. Small finds and any other vulnerable objects will be recorded individually (Individually Registered Finds, or IRFs), appropriately packaged and stored in appropriate specialist systems, as required. This will be undertaken within two days of the objects being excavated, in compliance with Section 5.4 of the brief.

3.2.23 As specified in Section 5.6 of the brief, deposition and disposal of artefacts will be agreed with the legal owner and the recipient museum prior to the commencement of the works. All retained artefacts will be cleaned and packaged in accordance with the requirements of the recipient museum (Section 5.7 of the brief). If the landowner should decide to retain artefacts, adequate provision will be made for recording them.

3.2.24 In the event of the recovery of any intrinsically valuable artefacts, the terms of the Treasure Act 1996 will be followed with regard to any finds that might fall within its purview. Any such finds will be removed to a safe place and reported to the local coroner as required by the procedures as laid down in the *Code of practice* (DCMS 2002), and in accordance with Section 5.13 of the brief. Where removal of intrinsically valuable objects cannot be effected on the same working day as the discovery, suitable security measures will be taken to protect the finds from theft. It should be noted that *there is a presumption that objects of treasure found during the course of archaeological excavations will be kept with the rest of the archaeological archive*.

3.2.25 In certain circumstances where unusual or extremely fragile and delicate objects are found, their recovery may be undertaken by appropriate specialists. In accordance with Section 5.1 of the brief, provision will be made for on-site selection of vulnerable materials requiring conservation, and for conservation measures to be undertaken by specialists on-site, as required. The objects will be exposed, lifted, cleaned, conserved, marked, bagged and boxed in accordance with the guidelines set out by the United Kingdom Institute of Conservation (UKIC 1983; 1990), and in *First aid for finds* (Watkinson and Neal 1998). They will be stored in a secure, controlled environment, and storage conditions will be subject to regular monitoring. OA maintains close relationships with Ancient Monuments Laboratory staff at the University of Durham and, in addition, employs in-house artefact specialists, with considerable expertise in the investigation, excavation, and finds management of sites of all periods and types, who are readily available for consultation. Finds storage during fieldwork and any site archive preparation will follow

professional guidelines. Emergency access to conservation facilities is maintained by OA North with the Department of Archaeology, University of Durham.

3.2.26 Where required, preliminary conservation and stabilisation of objects will be undertaken as soon as practicable during, or upon completion of, the fieldwork, in accordance with Sections 5.15 and 5.20 of the brief. Particularly vulnerable materials requiring conservation will be transported to appropriate facilities without delay.

3.2.27 ***Palaeoenvironmental sampling strategies***: it is envisaged that it will be possible to retrieve bulk samples from securely stratified archaeological deposits within the excavated area of the SAM, including samples from the fills of the Vallum ditch, from the Vallum mounds, and possibly from earlier deposits sealed beneath the mounds. Adequate provision for environmental sampling will therefore be included in the programme of work. In the absence of Dr Jacqui Huntley, English Heritage's Archaeological Science Advisor for Hadrian's Wall, and in agreement with Mike Collins, the Hadrian's Wall Archaeologist, the following sampling strategy and the scope of the proposed palaeoenvironmental works have been discussed with Dr Sue Stallibrass, English Heritage's Archaeological Science Advisor for north-west England, and her comments have been integrated into the strategy. The scope of the palaeoenvironmental works will also be discussed further with Dr Huntley, as required, during the course of the excavations. Samples will be taken in accordance with current best practice, using the methodologies outlined by English Heritage (English Heritage 2002). A copy of OA's Environmental Procedures Manual is appended to this Project Design (*Appendix 3*). A register of environmental samples will be maintained.

3.2.28 OA employs palaeoenvironmental specialists with considerable expertise in the investigation, excavation and management of sites of all periods and types, who are readily available for consultation (see *Section 5*). The advice of OA's environmental department will be sought for the recovery of the following sample types: bulk samples (charred plant remains, cremation burials and pyre deposits, waterlogged remains, artefacts and metalworking debris); series samples and monolith samples (waterlogged plant remains, snails, palynology, diatoms, soil micromorphology, pedology and chemicals). English Heritage's Archaeological Science Advisor for Hadrian's Wall will also be consulted where appropriate.

3.2.29 In accordance with Sections 5.5 and 5.9 of the brief, a suitably qualified specialist, either Elizabeth Huckerby, OA North's Environmental Manager, or Dr Denise Druce, OA North Palaeoenvironmental Project Officer (see *Section 5*), will assess the environmental potential of the site through the examination of suitable deposits, enabling the formulation of an approved overall sampling strategy, to be agreed with English Heritage's Archaeological Science Advisor for Hadrian's Wall. The following analyses will form part of the excavation, as appropriate:

- soil pollen analysis and the retrieval of charred plant macrofossils and land molluscs from former dry-land palaeosols and cut features. Deposits of potentially high significance identified during the course of the evaluation (CFA 2005) include soils sealed beneath the Vallum mounds and deposits of turf within the Vallum mounds themselves;

- the retrieval of plant macrofossils, insect remains, molluscs, pollen and diatoms from waterlogged or sealed deposits such as clay with anaerobic or anoxic deposits, including the fills of the Vallum ditch;

- advice will be sought from the English Heritage Archaeological Science Advisor for Hadrian's Wall and OA faunal specialists on the potential of the site for producing bones of fish and small vertebrates. In view of the paucity of adequately sieved deposits from sites associated with Hadrian's Wall (Huntley *et al*, in prep), an appropriate sieving programme will be high priority from the outset. Faunal remains, collected by hand and sieved, are to be assessed and analysed, if appropriate;

- advice will be sought from OA's geo-archaeology department on whether a soil micromorphological study or other analytical techniques, such as studies of fluvial deposits, will enhance understanding of site formation processes on the site or the landscape context of Hadrian's Wall. In view of the paucity of detailed pedological studies of buried soil horizons associated with Hadrian's Wall (Petts and Gerrard 2006, 9) including truncated soil profiles, an appropriate programme of sampling and analysis will be undertaken on any significant buried soils (of any period) encountered during the proposed archaeological works;

3.2.30 The environmental sampling strategies employed will vary according to the perceived importance of the strata under investigation. For bulk samples from 'dry' deposits, 40-60 litres, or 100% of the deposit if less than 40 litres is available, will be taken for flotation for charred plant remains, of which a minimum of 10 litres will be processed for assessment. In the case of waterlogged deposits, a minimum of 10 litres will be sampled. Incremental bulk samples of 10 litres will be taken from any waterlogged or mineralised deposits in order to recover any preserved macroscopic plant remains and invertebrate remains. Columns for the analysis of pollen, diatoms and soil profiles will be taken if appropriate, and mollusc samples will be collected if present. Other bulk samples for small animal bones, metallurgical debris (micro-slags and so on), and other small artefacts will be taken if suitable contexts are identified. All samples will be treated in a proper manner and to standards agreed in advance with the approved recipient museum. If required, arrangements for a site visit by English Heritage's Archaeological Science Advisor for Hadrian's Wall, and/or by any other appropriate palaeoenvironmental specialists, will be made, in order to determine the importance and sampling requirements for all deposits exposed during the investigation (Section 5.9 of the brief).

3.2.31 Waterlogged, anaerobic or anoxic organic materials will be dealt with in accordance with the relevant English Heritage guidelines (English Heritage 1995; 1996), in compliance with Section 5.16 of the brief.

3.2.32 ***Scientific dating strategies:*** it is anticipated that the site will probably yield material suitable for AMS dating if systematically sampled for carbonised and waterlogged plant remains. Material will be collected and assessed specifically for this purpose and suitable stratigraphic sequences will be targeted, together with material in primary positions that is associated with other datable material, such as pottery. OA has procedures for sampling and processing samples for radiocarbon dating and has established relationships with reputable dating laboratories. Other scientific (absolute) dating methods may include thermoluminescence dating of pottery and daub, optically stimulated luminescence dating of sediments, archaeomagnetic dating, and dendrochronology. Samples will be taken and assessed as appropriate, in accordance with Section 5.10 of the brief. It is envisaged that, subject to the survival of appropriate remains, sufficient dating samples will be taken from features and deposits of all periods from prior to the construction of the Vallum to the post-medieval period to facilitate chronological modelling using Bayesian statistical techniques.

3.2.33 ***Human remains***: these are not expected to be present, but if they are found during the archaeological works they shall be left *in situ*, covered, and protected (Section 5.12 of the brief). The client, English Heritage and the coroner will be informed immediately. Human remains will always be treated with respect. If removal is essential, it will only take place under appropriate Home Office and environmental health regulations. A Home Office licence will be obtained before human remains are disturbed. All burials requiring excavation will be adequately recorded prior to careful removal for further scientific study, and (unless the burial licence specifies reburial or cremation) long term storage with the receiving museum. Where human remains are encountered, the post-excavation assessment will contain a statement concerning the future retention of the assemblage, including options for reburial.

3.2.34 In accordance with Section 5.11 of the brief, the scope of the environmental analysis works and dating strategy will be determined by the Secretary of State, advised by English Heritage.

3.3 HEALTH AND SAFETY

3.3.1 OA North provides a Health and Safety Statement for all projects and maintains a Safety Policy. All site procedures are in accordance with the guidance set out in the *Health and Safety manual* compiled by the Standing Conference of Archaeological Unit Managers (SCAUM 1997). OA North will liaise with Birse Civils, who will be the principal contractor under CDM regulations, to ensure all current and relevant health and safety regulations are met.

3.3.2 A risk assessment will be completed in advance of any on-site works, and will be submitted to English Heritage and CCCHES for approval. Archaeological fieldwork will not commence before written approval has been obtained (Section 11.2 of the brief). OA North staff will be equipped with the appropriate PPE; Birse Civils have agreed to provide welfare facilities on-site.

3.3.3 OA North has professional indemnity to a value of £2,000,000, employer's liability cover to a value of £10,000,000 and public liability to a value of £15,000,000. Written details of insurance cover can be provided if required.

3.3.4 OA North will provide an archaeological team to attend to all archaeological works associated with the CNDR project within the area of the Hadrian's Wall SAM. OA North staff work a standard 7.5 hour day Monday to Friday. If required, staff can be asked to work overtime on weekdays or weekends, but this will incur additional charges over and above the fee outlined in the original costing; overtime will be charged in accordance with the rates previously supplied to Birse Civils Ltd.

3.4 OTHER MATTERS

3.4.1 OA North will not be responsible for the provision of Health and Safety logistical support; this will be provided by Birse Civils or their subcontractor, who will also be responsible for the provision of site security including secure offices. Access to the site will be arranged *via* Birse Civils or their subcontractor. All costings and timings assume that Birse Civils Ltd will provide OA North with the appropriate plant and other logistical support as required. Inefficient working practices and/or periods of stand down that might arise as a consequence of Birse Civils Ltd's failure to provide OA North with appropriate plant and logistical support as and when required could entail a variation to the original costing.

3.5 POST-EXCAVATION ASSESSMENT AND ARCHIVE PRODUCTION

3.5.1 ***Post-excavation and publication:*** the post-excavation programme will follow the model set out in *MAP 2* (English Heritage 1991). Immediately following completion of the fieldwork, an interim report will be produced collating the results of the archaeological works within the area of the SAM. The contents of the report will comply fully with the requirements set out in Section 8.1 of the brief, and it will be bound and paginated in accordance with Section 8.2 of the brief. Ten hard copies of the report and one electronic copy in PDF format will be deposited with English Heritage within six months of the completion of the fieldwork.

3.5.2 The data generated by the excavations will be subjected to a full archaeological assessment, in accordance with English Heritage recommendations (*op cit*, 15-19). It is intended that the assessment results will be included within the post-excavation assessment report for the CNDR project as a whole; this will be deposited with the CCCHER, and copies will be provided to English Heritage within three months of the

completion of the fieldwork, in accordance with Section 5.19 of the brief. However, should significant delays occur within the overall assessment programme, the DCMS, advised by English Heritage, may require a separate assessment of the archaeological works within the Hadrian's Wall SAM to be completed in advance of the other assessment work The assessment report will provide an overview of the results of the archaeological works and will present an assessment of the potential of the data (stratigraphic, artefactual, and environmental) recovered during the CNDR project to advance archaeological knowledge and to address current local, regional and national research aims. It will also present, through an updated project design (Section 8.3 of the brief), a series of research aims and objectives that can potentially be addressed by the data, and will identify the scope of the post-excavation work. Detailed and fully resourced proposals, accompanied by a method statement, task list and gantt chart (timetable), for a programme of post-excavation analysis, reporting and publication, will be presented.

3.5.3 Assessment of artefactual and environmental materials will be undertaken by suitably qualified personnel. In accordance with Section 5.17 of the brief, an assessment report will be compiled for each category of artefactual and ecofactual material. Each report will include a basic quantification of the material, a statement of its potential for further analysis and recommendations for additional work.

3.5.4 The results and recommendations set out in the assessment report, together with the updated project design, must be approved by all relevant parties (*op cit*, 20), including the project sponsor and English Heritage, before analysis commences. Adequate resources must also be made available to undertake the agreed programme of analysis and to adequately publish the results. An appropriate level of progress monitoring should also be agreed

3.5.5 Analysis will follow the recommendations, methodologies and research aims set out in the assessment report; the work will include the preparation of a research archive, followed by selection of data from the research archive to produce an academic report suitable for publication (*op cit*, 21). As with the assessment phase, should significant delays occur within the overall post-excavation and publication programme, the DCMS, advised by English Heritage, may require the results of the works undertaken within the Hadrian's Wall SAM to be published in advance of the rest of the CNDR material. Prior to publication, a copy of the completed report will be submitted to the project sponsor, to English Heritage, and to other relevant parties, for approval. The advice of one or more independent academic referees will also be sought. Following approval, and the incorporation of comments, the report will be submitted for publication in a relevant period journal or national archaeological publication, to be agreed with English Heritage and CCCHES, in accordance with Section 8.4 of the brief. Within one year of the completion of the fieldwork (Section 8.1 of the brief), a summary of the results will be produced for inclusion in the *Transactions* of the of the Cumberland and Westmorland Antiquarian and Archaeological Society.

3.5.6 English Heritage and CCCHES will be appropriately acknowledged in the published report, and in any other reports or publications generated (Section 8.6 of the

brief).

3.5.7 Within 12 months of the completion of the fieldwork, a presentation of the results of the excavations will be made to the general public, in compliance with Section 8.5 of the brief. A copy of all reports will be lodged with an appropriate public library (Section 8.7 of the brief.

3.5.8 ***Archive:*** once the final report is at the editorial stage, or shortly thereafter, the project archive will transferred to the recipient museum, in this case Tullie House Museum and Art Gallery in Carlisle. The results of the archaeological works within the SAM will form part of the overall CNDR project archive. In accordance with Section 9.1 of the brief, this will be produced to professional standards and in accordance with current best practice, as set out in *MAP 2, Appendix 3* (English Heritage 1991), in the guidelines produced by the United Kingdom Institute for Conservation (UKIC 1990), and the Archaeological Archives Forum's *Guide to Best Practice* (Brown 2007). The project archive represents the collation and indexing of all the data and material gathered during the course of the project. The IFA's Code of Conduct (IFA 2002) makes it clear that the deposition of a properly ordered and indexed project archive in an appropriate repository is an essential and integral element of all archaeological projects. A summary of the archive will be prepared and provided to all interested parties, following which the archive will be deposited with Tullie House Museum and Art Gallery, Carlisle.

3.5.9 Since it is considered desirable (Section 9.2 of the brief) that ownership of the finds should be transferred to an appropriate museum (in this case most probably Tullie House Museum and Art Gallery in Carlisle), landowners will be encouraged to transfer ownership, and to keep English Heritage and CCCHES informed in this regard.

3.5.10 ***Confidentiality:*** the final report is designed as a document for the specific use of the client, and should be treated as such; it is not suitable for publication as an academic report, or otherwise, without amendment or revision. Any requirement to revise or reorder the material for submission or presentation to third parties beyond the project brief and project design, or for any other explicit purpose, can be fulfilled, but will require separate discussion and funding.

4 WORK TIMETABLE

4.1 Following an initial two weeks of machine stripping of the site, supervised by either a Project Officer (PO) or a Project Supervisor (PS), it is anticipated that a period of seven weeks will be required to finish the stripping process and then excavate and record the features that are expected to be revealed. This timetable assumes the requisite and timely provision of plant or other logistical support (*Section 3.4.3*)

5 STAFFING PROPOSALS

5.1 The project will be under the overall charge of **Fraser Brown BA** (OA North Senior Project Manager) to whom all correspondence should be addressed.

5.2 An OA North Project Officer (PO), suitably qualified to direct and supervise the day-to-day archaeological works, will lead the archaeological team on site. In addition to the Project Officer, the team will comprise a Project Supervisor (PS) and up to four Project Assistants.

5.3 Assessment of finds from the excavation will be undertaken by OA North's in-house finds specialist **Christine Howard-Davis, BA MIFA** (OA North Finds Manager).

5.4 Assessment of palaeoenvironmental samples will be undertaken by **Elizabeth Huckerby**, **BA MSc** (OA North Environmental Manager), for the botanical remains, **Denise Druce, BA PhD** (OA North Environmental Project Officer), for the charcoal, and **David Smith**, **MA, PhD**, or **Emma Tetlow**, **PhD**, (Institute of Archaeology and Antiquity, University of Birmingham) for the insect remains. Animal bones will be assessed by **Lena Strid** (OA Archaeozoologist).

5.5 All staff will be suitably qualified and experienced for their project roles, and will familiarise themselves with the results of previous assessments and evaluations of the site prior to the start of work on site. All staff will be aware of the work required and will understand the project aims and methodologies (Section 11.3 of the brief).

6 MONITORING

6.1 The archaeological works shall be carried out to the satisfaction of the Secretary of State who will be advised by English Heritage. Written notice, two weeks prior to the commencement of the works, will be given to English Heritage and CCCHES (Section 10.1 of the brief). A timetable will be provided to Mike Collins, Bessie Surtees House, 41 Sandhill, Newcastle-Upon-Tyne, NE1 3JF, in order that an English Heritage representative can have the opportunity to inspect and advise on the works, in accordance with Section 10.1 of the brief. Reasonable access to the site for the purpose of monitoring the archaeological works will be afforded to English Heritage's Hadrian's Wall Archaeologist or his nominee and the CCCHES archaeologist at all times (Section 10.2 of the brief). No work will take place until this Project Design has been submitted to and approved by the Secretary of State, advised by English Heritage.

6.2 OA North will ensure that any significant results are brought to the attention of Birse Civils, the CCCHES and English Heritage as soon as is practically possible.

REFERENCES

Breeze, D J, 2006 *J Collingwood Bruce's Handbook to the Roman Wall*, 14th edn, Newcastle upon Tyne

Brennand, M (ed), 2006 *The archaeology of north-west England: an archaeological research framework for the north-west region. Volume 1: resource assessment*, Archaeol North-West, **8**, Manchester

Brennand, M (ed), 2007 *Research and archaeology in north-west England: an archaeological research framework for the north-west region. Volume 2: research agenda and strategy*, Archaeol North-West, **9**, Manchester

Brennand, M, Chitty, G, and Newman, R, 2007 Research strategy, in M Brennand (ed), 2007, 159-97

British Geological Survey 1982 *Solid geology*, 1:250 000 map, sheet 54° N 04° W

Brown, D H, 2007 *Archaeological archives: a guide to best practice in creation, compilation, transfer and curation*, Archaeological Archives Forum
http://www.archaeologists.net/modules/icontent/inPages/docs/pubs/Archives_Best_Practice.pdf

http://www.archaeologists.net/modules/icontent/inPages/docs/pubs/Archives_Best_Practice.pdfCFA, 2005 *Carlisle Northern Development Route: archaeological evaluation; Phase 3,* unpubl rep

Caruana, I, and Cherry, J, 1994 A microlith from Carlisle, *Trans Cumberland Westmorland Antiq Arch Soc*, n ser, **94**, 281-2

CFA 2005a *Carlisle Northern Development Route: archaeological evaluation; Phase 2,* unpubl rep

CFA 2005b *Carlisle Northern Development Route: archaeological evaluation; Phase 3,* unpubl rep

Countryside Commission, 1998 *Countryside character Volume 2: North West. The character of England's natural and man-made landscape*, Cheltenham

DCMS, 2002 *Treasure Act 1996, Code of practice*, revised edn
http://www.culture.gov.uk/NRrdonlyres/C1027393-6D96-4B2A-86EF-DC1021117190/0/Treasure_Act_P0164.pdf

English Heritage, 1991 *Management of archaeological projects*, 2nd edn, London

English Heritage, 1995 *Guidelines for the care of waterlogged archaeological leather*, London

English Heritage, 1996 *Waterlogged wood: guidelines on the recording, sampling, conservation and curation of waterlogged wood*, London

English Heritage, 2002 *Environmental archaeology: a guide to the theory and practice of methods, from sampling and recovery to post-excavation* (http://194.164.61.131/Filestore/archaeology/pdf/enviroarcg.pdf)

English Heritage 2006 *Management of research projects in the historic environment: the MoRPHE project managers' guide*, London

Evans, J G, 1975 *The environment of early man in the British Isles*, London

Heywood, B, 1965 The Vallum - its problems restated, in M G Jarrett and B Dobson (eds), *Britain and Rome: essays presented to Eric Birley*, Kendal, 85-94

Hingley, R, in preparation The indigenous population, in M Symonds (ed), in prep a

Hodgkinson, D, Huckerby, E, Middleton, R, and Wells, C, 2000 *The lowland wetlands of Cumbria*, Lancaster Imprint Ser, **8**, Lancaster

Hodgson, J, and Brennand, M, 2007 Prehistoric period research agenda, in M Brennand (ed), 2007, 31-54

Hodgson, N, 1997 Relationships between Roman river frontiers and artificial frontiers, in W Groenman-van Waateringe, B L van Beek, W J H Williams, and S L Wynia, *Roman frontier studies 1995*, Oxbow Monog, **91**, Oxford, 61-6

Huntley, J, in preparation Landscape and environment overview, in M Symonds (ed), in prep a

Huntley, J, Gates, T, and Stallibrass, S, in preparation Landscape and environment resource assessment, in M Symonds (ed), in prep a

IFA, 2000 *Code of approved practice for the regulation of contractual arrangements in field archaeology*, revised edn, Reading

IFA, 2001 *Standard and guidance for archaeological excavation*, revised edn, Reading

IFA, 2002 *Code of Conduct*, revised edn, Reading

IFA, nd *IFA guidelines for finds work*, Reading

LUAU 1996 *Cumbria Northern Relief Road. archaeological assessment*, unpubl rep

McCarthy, M R, Zant, J M, Hughes, V, and Robertson, D, 1997a *Knockupworth Farm, Carlisle, Cumbria: report on an archaeological evaluation on the proposed line of the Carlisle Northern Relief Road*, Carlisle Archaeological Unit, unpubl rep

McNeil, R, and Newman, R, 2006 The industrial and modern period resource assessment, in M Brennand (ed), 2006, 165-94

Newman, C, 2006 The medieval period resource assessment, in M Brennand (ed), 2006, 115-44

Newman, C, and Newman, R, 2007 The medieval period research agenda, in M Brennand (ed), 2007, 95-114

Newman, R, and Brennand, M, 2007 The early medieval period research agenda, in M Brennand (ed), 2007, 73-94

OA North 2004, *Plotting the course of the river Eden through Carlisle: documentary search and GIS plot*, unpubl rep

OA North 2008 *Carlisle Northern Development Route: Outline Archaeological Strategy (Project Design 001)*, unpubl rep

Petts, D, and Gerrard, C (eds), 2006 *Shared visions: The North-East regional research framework for the historic environment*, Durham

Philpott, R, and Brennand, M, 2007 The Romano-British period research agenda, in M Brennand (ed), 2007, 55-72

Ramshaw, D, *The Carlisle Navigation Canal, 1821-1853*, Carlisle

Royal Commission on Historic Monuments (England), 1996 *Hadrian's Wall characterisation survey*, London

SCAUM, 1997 *Health and Safety manual*, Poole

Symonds, M (ed), in preparation a *An archaeological research framework for Hadrian's Wall: draft resource assessment*

Symonds, M (ed), in preparation b *An archaeological research framework for Hadrian's Wall: draft research agenda*

Symonds, M (ed), in preparation c *An archaeological research framework for Hadrian's Wall: draft research strategy*

Symonds, M, in preparation d Pre-Roman, in M Symonds (ed), in prep a

Symonds, M, in preparation e The post-Roman archaeology of Hadrian's Wall, in M Symonds (ed), in prep a

Tolan-Smith, C, in preparation The lithic material, in J M Zant, in preparation *Roman and medieval Carlisle: the northern Lanes*

UKIC, 1983 *Conservation guidelines No. 2: packaging and storage of freshly*

excavated artefacts from archaeological sites, London

UKIC, 1990 *Guidelines for the preparation of archives for long term storage*, London

Watkinson, D, and Neal, V (eds), 1998 *First aid for finds: a practical guide for archaeologists*, 3rd edn, London

Wilkinson, D, 1992 *Oxford Archaeology Field Manual*, unpubl doc

Wilmott, T, in preparation The Vallum, in M Symonds (ed), in prep a

Zant, J M, 1998 An archaeological evaluation at William Howard School, Brampton, Cumbria, *Trans Cumberland Westmorland Antiq Arch Soc*, n ser, **98**, 298-9

N

Extent of Scheduled Area

5

Machine Excavated Trench

Machine Excavated Trench

1

4

Railway/Canal

Vallum Ditch

Projected Line of North Mound

Projected Line of Vallum Ditch

2

3

556900

556800

337200

337300

Limit of Excavation

North Mound Deposits

Area previously excavated by Oxford Archaeology North

Areas to be Topsoil stripped

Proposed Drainage Carrier

0 20 m

1:750 @ A3

CARLISLE NORTHERN DEVELOPMENT ROUTE

Figure23: Vallum Drainage Works